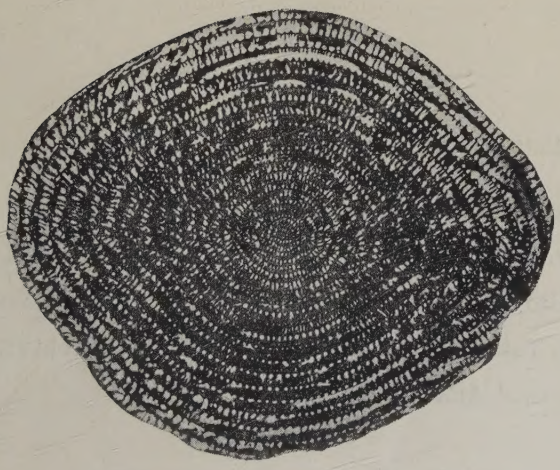
日本古生物学會
報告・紀事

Transactions and Proceedings of the Palaeontological Society of Japan

New Series No. 23



日本古生物學會
Palaeontological Society of Japan
August 31, 1956

CONTENTS

TRANSACTIONS

All Communications relating to this Journal should be addressed to the

PALAEONTOLOGICAL SOCIETY OF JAPAN

Geological Institute, Faculty of Science, University of Tokyo, Japan

Trans. Proc. Palaeont. Soc. Japan, N. S., No. 23, pp. 205—212, Pl. 30, Aug. 31, 1956

290. *YEBISITES*, A NEW LOWER JURASSIC AMMONITE FROM JAPAN*

TATSURO MATSUMOTO

Department of Geology, Kyushu University

日本のユラ系下部産の菊石新属 *Yebisites*: 宮城県志津川町附近のユラ系の下部から出て，暫定的に *Alsatites* として，リストにあげられたことのある標本をよくしらべた。その結果これは特異な性状をもち，新属を代表するものであることがわかつた。こゝに *Yebisites onoderai* として記載する。新属は，*Arietitaceae* としては珍しい，周期的のくびれをもつ。縫合線・殻形・肋は，*Alsatites* や *Caloceras* のそれに近似である。腹面の龍骨は狭小で，*Alsatites* の典型者のそれと同一ではないが，*Vermiceras* などに於けるような溝はなく，また腹面の平坦化もみない。住房の肋の腹側末端が，やゝ膨らむ傾向は，Schlotheimids に通じるものがあるが，他の点ではちがう。結局分類系統としては，Psiloceratidae 科中の亜科 Alsatitinae に入れるべきものである。この化石の産出層準は，志津川層群韮ノ浜層中の三角貝砂岩の石灰質部で，従来菊石は未知であつた。新属だから，対比上必しも有力な資料ではないが，Alsatitinae の進化史一般からいうと，やはりユラ系下部のヘッタング階の中・上部が暗示される。三角貝砂岩の下位の，いわゆる蜆貝層（この蜆貝には問題があるが）が，ユラ系最下部か，レーチックにも及ぶかは，依然問題である。

松本達郎

Foreword

When I visited in 1943, together with Mr. A. ONO, the Shizukawa district, a classical Jurassic area in Northeast Japan, an interesting ammonite was collected by Mr. ONODERA, a fisherman who helped with our field work. He kindly supplied it for us to study, but it has been left undescribed because of some uncertainty in its indentification. It was provisionally listed as *Alsatites onoderai* MATSUMOTO (MS) in certain Japanese writings (e. g. T. MATSUMOTO 1953 and other mimeographs) and the nominal species was recently cited by Professor T. KOBAYASHI and Mr. K. MORI (1954) in their English paper on Trigonians.

In the meanwhile, I had in 1953–54 an opportunity of visiting England, where I fortunately studied the Japanese form in comparison with the typical *Alsatites* and also with other related forms. As a result I am now inclined to propose a new genus for it as a member of family Psiloceratidae. The systematic description follows below with a stratigraphical note.

* Read June 18, 1955; received Oct. 28, 1955.

Systematic Description

Superfamily Arietitaceae

Family Psiloceratidae HYATT, 1867

Subfamily Alsatitinae SPATH, 1924

Genus ***Yebisites***** nov.

Type species.—*Yebisites onoderai* sp. nov.

** *Yebis* [惠比須]: a name of an oriental deity, dressed like a fisherman.

Generic diagnosis.—Evolute and widely umbilicate whorls of rounded to subelliptical cross-section, provided with periodic constrictions, simple ribs and a rather weak ventral keel, without furrows. In the outer whorl the ribs show a forward bend towards the venter and are slightly swollen at their ventral ends. Apertural margin has a moderately projected rostrum, lateral sinuses and umbro-lateral lappets. Suture-line similar to that of *Alsatites*, having long and large lateral lobe, slender saddles on both sides of it and descending 'auxiliaries'.

Affinity.—The periodic constrictions which characterize the present genus are quite unusual in the Arietitaceae. (The character is found only in some Dactylioceratids among the Lower Jurassic Ammonitina.) Certainly the distinctness and frequency of constrictions are of not more than specific value in some cases, as in Cretaceous *Epigoniceras* and *Hauericeras*, but in the present case, the development of constrictions cannot be ignored. They are too regular and too distinct to be regarded as an accidental feature, say a pathological one. The faint line just in front of the constriction certainly shows the apertural margin of the shell.

The suture-line is similar in general pattern to that of *Alsatites* or of *Schlotheimia* (*Waehneroceras*). DONOVAN (1952, p. 643) has noted that the probable difference of suture-line between *Alsatites* and *Waehneroceras* is in the length and narrowness of the external saddle as compared with the first lateral saddle. Although the partially waterworn condition of the specimen unfortunately prevents us from making a precise decision, the observable suture-line is rather suggestive of the *Alsatites* type.

Waehneroceras has no keel at any growth-stage and its ribs are weakened on the outer whorls, while the present new genus has a ventral keel and there is no sign of weakening of ribs on the outer whorl.

The flattening of venter and development of furrows, as seen in *Vermiceras*, are not found in the present genus. From this fact and from the difference in the suture-line the new genus is not a member of the Arietitidae to which *Vermiceras* belongs.

The ventral keel, though small but fairly distinct on the internal mould, looks rather blunt on the outer surface of the shell, being not much different from, if not equal to, that of *Alsatites*.

The ribs in the inner whorls are mostly straight and at right angles to the ventral keel, without crossing it; those in the outer whorls are gently arcuate (concave anteriorly) on the sides and show a slight thickening or, better to say, broadening at the ventro-lateral shoulder and a considerable projection in approaching the mid-line of the venter, though dying out before reaching the keel. In the curvature of the rib the present genus has in some degree affinity with *Alsatites* and also *Psiloceras* (*Caloceras*).

The swollen ventral ends of the ribs are unlike those in other Alsatitids, but appears to me to be a Schlotheimid character, although in other respects the ammonite is an Alsatitid.

To sum up, the new genus is, in the present state of our knowledge, best referable to the subfamily Alsatitinae and is presumed to be a special offshoot which has acquired the periodic constrictions.

Yebisites onoderai sp. nov.

Pl. 30, figs. 1 a, b; 2 a, b, b′, c, c′, d.

1953. *Alsatites onoderai* MATSUMOTO, *nom. nud. in* KOBAYASHI *et al. Historical Geology*, 2, p. 367 (listed only).

Material.—Holotype, Department of Geology, Kyushu University, reg. no. G 1001, relatively well preserved as compared with the usual Jurassic ammonites in Japan. The last whorl is partly missing.

Description.—Shell discoidal, with a wide umbilicus and slight involution; increase of whorls very slow, except in the body chamber in which the height increases rapidly. Whorls depressed in youth, almost as high as broad in the middle growth-stage and somewhat compressed in the last whorl, rounded and then subelliptical in cross-section, with an arched ventral side and gently convex flanks; the maximum breadth being a little nearer to the umbilicus than to the venter.

A median keel appears in a fairly early growth-stage, being distinct at a diameter of 15 mm. and continues to develop throughout life. On the internal mould it is small (i. e. low and rather narrow), rounded and without furrows on both sides of it; on the shell rather blunt.

Constrictions well-marked, about three in each volution, broad and considerably deep; running radially on the flanks and crossing the venter without notable bend. The apertural margin, which is traced as a faint stria in front of the constriction, has a ventral rostrum-like projection, gentle lateral sinuses and short umbro-lateral lappets.

Shell ornamented with numerous simple ribs of moderate strength, which are rather crowded in the inner whorls*, usually as broad as the interspaces in the middle stage and in the last whorl widely spaced. The ribs are almost straight and radial in youth, slightly prorsiradiate and gently arcuate (concave anteriorly) in the middle stage and in the last whorl considerably arcuate and bent distinctly forward near the ventro-lateral shoulder. The ribs die out before reaching the keel, without forming tubercles. In the last whorl they are somewhat broadened near the ventro-lateral shoulder (without angulations) and from this broadened point gradually become obsolete, showing a considerable projection, but never cross the keel. The constriction passes over the ventral side at right angles to the keel, which in turn runs across the constriction.

Suture-line characterized by long L, slendler saddles on both sides of L and the obliquely descending 'auxiliaries' which are suspensive. Although the observable external saddle is secondarily worn, it is presumed to be nearly as long as, and somewhat more slender than, the lateral saddle.

Dimensions (in mm.).—

	Diameter	Height	Breadth	(B/H)	Umbilicus(%)
(1)	[90]	25	21		[51(56.6%)]
(2)	70	18(±)	18(±)	(1.0)	41(59%)

(1) Preserved last whorl, the diameter and umbilicus of which are estimated from the restored figure.

(2) The next inner whorl.

Remarks.—To what has been mentioned in the affinity of the genus, I add here some minor points or details.

The keel of *Alsatites* has been described as typically blunt and rounded and indeed the specimens which I have

* The number of ribs in one volution is 55 at a diameter of 25 mm.

observed as well as the published figures do show that character. But I have found a specimen at the Sedgwick Museum (in the Drawer 105, without reg. no., J. F. WALKER Collection, 1908, Hettangian of Whitby, labelled as '*Caloceras liassicum* (D'ORBIGNY)' of a probable *Alsatites*, whose keel on the internal mould is quite similar to that of the present form, being small but fairly distinct.

The density of the ribbing is said to be an important character in the Jurassic ammonites. In the present species the ribs are more dense in the inner whorls and generally more widely spaced in the outer whorl, but the most widely spaced ribs are found in the earlier, instead of later, half of the body whorl. In some case, as in the outer whorls of *Psiloceras* (*Caloceras*) *johnstoni* (J. DE SOWERBY) and *P.* (*C.*) *multicostatum* DONOVAN, there is some variability in the rib-spacing. The fact has already been pointed out by DONOVAN (1952).

A specimen which I have examined at the Sedgwick Museum (in the Drawer 105, without reg. no., labelled as *Caloceras johnstoni* (SOWERBY), LECKENBY Coll., Lower Lias, Robin Hood's Bay, England) has great irregularity in the arrangement of the ribs at diameters from about 40 mm. to 65 mm. The extremely wide interspaces of the ribs among less widely spaced ones look at first sight like wide constrictions, but they cannot be said as true constrictions, because they occur very irregularly and do not show deepening. Such a character may have nothing to do with the unmistakable constriction of the present species, but its meaning is by no means perfectly explained.

Finally, I must confess that we are far from a clear conclusion as to the phylogenetic relation of the present form with other species. The isolated occurrence is one of the resasons for the difficulty. The closest European relation seems to be *Alsatites proaries* (NEUMAYR), which, however, has the broad and blunt keel of *Alsatites* type and more numerous ribs. For that species *Proarietites* was proposed by LANGE (1922), but I agree with SPATH (1924, p. 201) to regard *Proarietites* as a synonym of *Alsatites*. Therefore *Yebisites* cannot be synonymized with *Proarietites*.

Occurrence.—The calcareous sandstone (the so-called *Trigonia*-Sandstone), i.e. the Upper Member of the Niranohama Formation, Shizukawa Group, exposed at loc. Sz-13 on the west of Niranohama*, Shizukawa-machi, Motoyoshi-gun, Miyagi Prefecture [Province Rikuzen]. Very rare.

A Stratigraphical Note

Although the Shizukawa district is one of the classical Jurassic areas in Japan, we have only rough knowledge of its stratigraphy. As precise fieldwork is now being undertaken by Mr. T. SATO, I tabulate below the outline of the stratigraphical succession in the Shizukawa Group, depending on the unpublished manuscript of T. MATSUMOTO and A. ONO**, as well as on the previous works. In ascending order:

Underlying: *Saragai Formation* (Upper Triassic Norian)

~~~~~ Unconformity ~~~~~
(apparently parallel)

Shizukawa Group [志津川層群].—A series of strata representing an imperfect cycle of sedimentation, the upper part of

* 宮城県本吉郡志津川町韮ノ浜西海岸

** The manuscript was submitted once to the Geological Survey of Japan for a part of 'The Geology of Japan', but has not been published.
~~~~~

which is probably eroded away.

(1) *Niranohama Formation* [韮ノ浜層].—Deposits of the basal or marginal facies which indicates the beginning of the new transgression, 80–100 m.

(a) *Lower Member* ['Corbiculid-beds'].—Black shale and sandy shale, predominant, sometimes calcareous and occasionally with intercalated conglomerate, pebbly sandstone and coaly shale. There are a number of fossiliferous beds. Bivalves of the brackish and shallow-sea environments.

(b) *Upper Member* ['*Trigonia*-sandstone'].—Mainly coarse-grained sandstone; subordinately pebble-bearing sandstone and fine-grained sandstone; cross-laminated in some part. Fossil shell beds characterized by Trigonians and others of the shallow open-sea environments are included.

(2) *Hosoura Formation* [細浦層].—Black fine-sandy shale, often calcareous, and dark coloured silty sandstone, 60–100 m. The lower part is more sandy, containing drifted vegetable fragments, while the upper part consists mainly of fine-sandy shales with intercalated thin layers (10–20 cm thick) of fine to coarse sandstone. Fossils of ammonoids, belemnites, gastropods and pelecypods are common but rather sporadically distributed.

~~~~ Unconformity ~~~~
(apparently parallel)

Overlying: *Hashiura Group* [橋浦層群] (probably Middle-Upper Jurassic), representing another cycle of marine sedimentation. In the northern and western wing of the Shizukawa synclinal basin the Hashiura Group directly overlies Lower-Middle Triassic Inai Group.

The majority of the ammonites hitherto described (Yokoyama 1904, 1915, Sato 1954a, b) came, or are considered to have been derived, from the Hosoura Formation. A single specimen of *Yebisites onoderai* described above was obtained from the calcareous portion of the pebble-bearing coarse sandstone which belongs to the Upper Member of the Niranohsma Formation. It is therefore the first occurrence of an ammonite at such a low horizon of the Shizukawa Group.

Apart from the palaeontological interest, the discovery is important for the stratigraphical problem of the Shizukawa Group. Because the form in question belongs to a new genus and because there are no reliable ammonites occurring at the same horizon and in the sub- or superjacent beds, it is very difficult to decide accurately its geological age. However since the new genus is regarded as a member of subfamily Alsatitinae in Psiloceratidae, its age is presumed to be somewhere in or near 'the middle' or late Hettangian, from the general evolutional history of the group and of the related forms.

Now the question remains whether the Niranohama Formation is wholly referable to the Hettangian only or whether it has a wider range. The underlying Saragai Formation has been considered as Norian from the abundant occurrence of *Entomonotis ochotica* (Keyserling) and its allies (e. g. K. Ichikawa, 1950). The Rhaetian in the proper sense is regarded as lacking, being probably represented here by the unconformity between the Saragai and Nirahohama Formations. Although
~~~~

many authors believe that the Rhaetian deposits are generally absent in Japan, I am not quite free from any doubt about the subject. The so-called brackish and shallow-sea faunule of the Lower Member of the Niranohama Formation has not been thoroughly studied. The hitherto described species are "*Cyrena*" *elliptica* YOKOYAMA, "*Cyrena*" *lunulata* YOKOYAMA, "*Perna*" *rikuzenica* YOKOYAMA, "*Gervillia*" *trigona* YOKOYAMA, *Geratrigonia hosourensis* (YOKOYAMA) and *Geratrigonia lata* KOBAYASHI; besides them some ill-preserved plant remains including *Baiera* (?) sp. are contained. Among them the first species were transferred subsequently (K. SUZUKI & K. OYAMA, 1943; K. SUZUKI, 1949, p. 94) to *Polymesoda* (*Isodomella*) of the Corbiculidae, without, however, a detailed palaeontological discussion. The occurrence of the Corbiculids at such a low horizon is unusual, if we consider the distribution of the family in the world*. Anyhow more precise information on the forms is wanted. *Geratrigonia* KOBAYASHI is again a peculiar Trigonian, whose distribution and age-correlation outside Japan are a future problem. On the other hand, it is not at present easy to tell from the sedimentary features how slowly or rapidly the deposition of the Nirahohama Formation took place.

In the contemporary faunule of the Upper Niranohama, the following species have been palaeontologically described: *Trigonia senex* KOBAYASHI & MORI, *Geratrigonia hosourensis* (YOKOYAMA) var. *convexa* KOBAYASHI, *Geratrigonia lata* KOBAYASHI, *Vaugonia yokoyamai* KOBAYASHI & MORI, *V. niranohamaensis* KOBAYASHI & MORI, *V. namigashira* KOBAYASHI & MORI, "*Belemnites*" sp., "*Belemnopsis*" sp. and *Latomeandra yabei* (EGUCHI)**. All of them belong to more or less long-ranged genera, so that they are not useful, at least for the time being, for the international correlation precise enough for the requirements of ammonite-palaeontologists.

If we turn to the superjacent Hosoura Formation, YOKOYAMA's generic assignment of the ammonites is obviously out of date. T. SATO, who is now carrying on careful work on the ammonoid faunas, has reported (1954 a, b) *Tmetoceras* and *Hammatoceras*, both of which indicate far later ages (Upper Toarcian-Lower Bajocian). Apart from YOKOYAMA's *Ammonites* sp. and '*Schlotheimia*' *jimboi*, no reliable species of Upper Hettangian, Sinemurian and Pliensbachian ages have been described. Without complementary works on ammonites of the Hosoura Formation, the significance of the present new genus cannot be adequately evaluated.

Acknowledgements

I wish to thank Dr. W. J. ARKELL and Dr. D. T. DONOVAN for helps kindly given during the preparation of this paper; also Mr. W. N. EDWARDS, the Keeper of Geology, British Museum (Natural History), Professor W. B. R. KING and Mr. A. G. BRIGHTON of the Sedgwick Museum, Cambridge, for permission to carry out the work there as a British

* Mr. R. CASEY has kindly informed me on the subject (by personal communication in July 1954) in connexion with the preparation of the manuscript of Corbiculidae in the forthcoming 'Treatise on Invertebrate Palaeontology'.

** EGUCHI originally (1934) assigned the age of this coral species to "Lower Liassic" but later (1951) changed his dating to "Middle Jurassic" without mentioning any reason.

Council Scholar.

Works Cited

DONOVAN, D. T. (1952), The Ammonites of the Blue Lias of the Bristol District. Part I. Psiloceratidae and Schlotheimidae, *Ann. Mag. Nat. Hist.* [12], 5, 629-655, pls. xxii, xxiii.

EGUCHI, M. (1934) On a New Lower Jurassic Coral, *Isastraea yabei* n. sp. from Hosoura near Sizugawa-mati, Motoyosi-gun, Rikuzen Province, Japan. *Japan. Jour. Geol. Geogr.* 11, 157-160, pls. xvi-xvii.

—— (1951), Mesozoic Corals from Japan. *Sci. Rep. Tohoku Univ.* [2], 24, 1-96, pls. i-xxviii.

HYATT, A. (1867), The fossil Cephalopods of the Museum of Comparative Zoology. *Bull. Mus. Comp. Zool. Harvard* 1, 11-102.

ICKIKAWA, K. (1950), Saragai Group in Kitakami Massif, with special reference to *Entomonotis* (in Japanese). Jour. Geol. Soc. Japan, 56, 289-290 [北上山地南部の皿貝層群，特に同層群中の *Entomonotis* について，地質学雑誌 56 巻 656 号]

KOBAYASHI, T. (1954), Studies on the Jurassic Trigonians in Japan, Part I. Preliminary Notes. *Japan. Jour. Geol. Geogr.* 25, 1,2, 61-80

—— & K. MORI (1954), Studies on the Jurassic Trigonians in Japan, Part II. *Prosogyrotrigonia* and Trigoniinae. *Japan. Jour. Geol. Geogr.* 25, 3-4, 155-175, pls. xv, xvi.

—— & —— (1955), Studies on the Jurassic Trigonians in Japan, Part III. The Vaugoniinae from the Kitakami Mountains in North Japan. *Japan. Jour. Geol. Geogr.* 26, 1-2, 75-88, pls. iii, iv.

LANGE, W. (1922), Über dem untersten Lias der Herfder Mulde. *Jahrb. Preuss. Geol. Land.* 42. or 461-571.

—— (1924), Über die Psilonotenstufe und die Ammonitenfauna des untersten Lias Norddeutchlands. *Jahrb. Preuss. Geol. Land.* 44, 177-208.

MATSUMOTO, T. (1953), Jurassic *in* T. KOBAYASHI *et al. Historical Geol.* 2, 325-377, Tokyo (in Japanese). [地史学下巻第 17 章侏羅紀，東京 朝倉書店]

NEUMAYR, M. (1879), Zur Kenntnis der Fauna des untersten Lias in den Nordalpen. *Abh. K. K. Geol. Reichsanst.* 7, 1-46, 7 pls.

SATO, T. (1954 a), Découverte de *Tmetoceras* dans le Plateau de Kitakami au Nord du Japon. *Japan. Jour. Geol. Geogr.* 24, 115-121, pl. xiii.

—— (1954 b), *Hammatoceras* de Kitakami, Japon, *Japan. Jour. Geol. Geogr.* 25, 1-2, 81-100. pls. vii-ix.

SPATH, L. F. (1924), The Ammonites of the Blue Lias. *Proc. Geol. Assoc.* 35, 186-211, pl. xviii.

SUZUKI, K. (1949), Development of the Fossil Non-marine Molluscan Faunas in Eastern Asia. *Japan. Jour. Geol. Geogr.* 21, 91-133.

SUZUKI, K. & K. OYAMA. (1943), Überblick über die Corbiculiden Ostasiens. *Venus.* 12, 138-149 (in Japanese with German résumé) [東亜産シジミ貝類概観，ヴイナス 12 巻]

WAEHNER, F. (1886), Beiträge zur Kenntniss der Tieferen Zonen des Unteren Lias in den Nordöstlichen Alpen, III. *Beitr. Pal. Geol. Oest. Ungarns.* 4, 135-226, pls. xv-xxx.

YOKOYAMA, M. (1904), On some Jurassic Fossils from Rikuzen. *Jour. Coll. Sci. Imp. Univ. Tokyo*, 18, Art. 6, 13pp., 2 pls.

—— (1915), On a Jurassic Ammonite from Rikuzen. *Jour. Geol. Soc. Tokyo*, 21, No. 253, (41)-(42), pl. xx.

Explanation of Plate 30

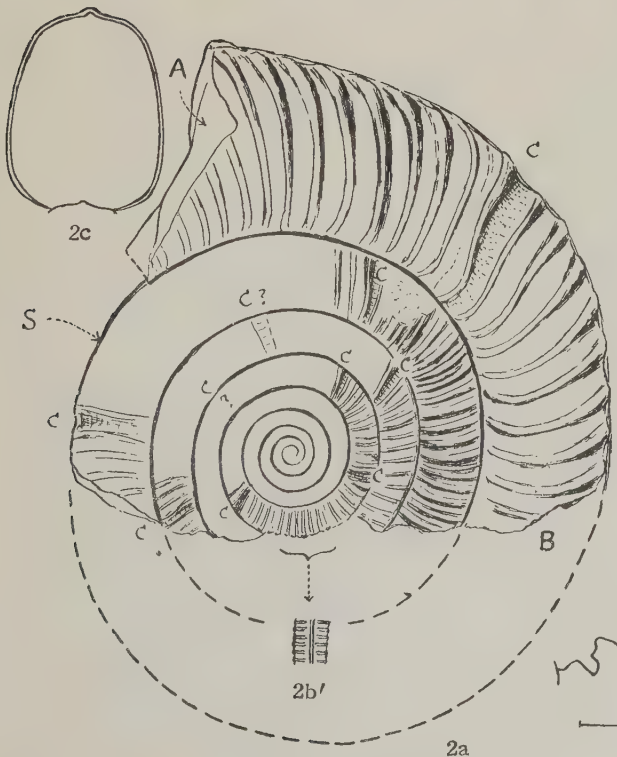
Yebisites onoderai sp. nov.

Fig. 1. Lateral (a) and ventral (b) views, natural size. Holotype, GK. G1001 from loc. Sz-13 on the west coast of Niranohama, Shizukawa-machi, Miyagi Prefecture, Upper Member of Niranohama Formation, Shizukawa Group (Lower Jurassic).

Fig. 2. Lateral (a) and ventral (b, b′) views, whorl-sections at A and B (c, c′) and enlarged suture-line (d) at s of the same specimen as above. C: constriction. A sketch in natural size, unless otherwise stated (T. M. del.).

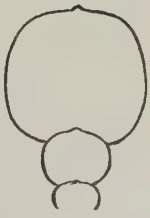
1b

1a

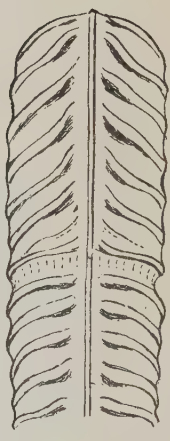


2c

2a

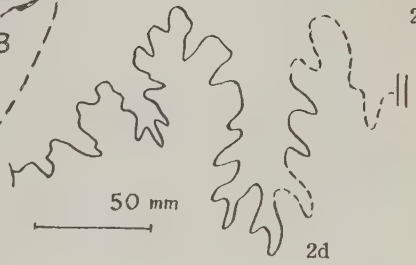


2c′



2b

2b′



2d

Trans. Proc. Palaeont. Soc. Japan, N. S., No. 23, pp. 213—217, 1 text-fig., Aug. 31, 1956

291. SOME PLIOCENE OTOLITHS FROM CHIBA PREFECTURE, JAPAN*

KOTORA HATAI

Department of Geology, Faculty of Education, Tohoku University, Sendai

千葉県の鮮新統からの二・三の耳石： 千葉県北中部の鮮新統から魚の耳石四新種を記載した。
畑 井 小 虎

Abstract

Four new species of fish otoliths are described from the Pliocene rocks of the north central part of Chiba Prefecture, namely, *Otolithus* (*Limanda*) *otomoi*, *Otolithus* (*Owstonia*?) *tsukizakiensis*, *Otolithus* (*Scombrops*) *kataokai*, and *Otolithus* (*Sebastodes*) *kokumotoensis*.

Introduction and Acknowledgements

Otoliths of fishes as well as of whales frequently occur from the Cenozoic rocks of Japan, but there are very few records in literature, possibly due to that they are not widely known and to that they resemble somewhat the broken parts of molluscan and cirripedian shells. Hitherto there has been no detail study of such ear bones from the Japanese Cenozoic rocks probably due in part to the difficulty in obtaining Recent material for comparison.

In dealing with the fossil otoliths of fishes the difficulty arises in the lack of literature bearing on the Recent species as most works in concern do not describe nor figure the otolith of the different species. In the publications treating the Recent otoliths it is regretted that discussions and figures are generally restricted to a very small number of species, that is to say, only to the species considered important in fisheries.

In the writer's study of the fossil fish ear bones, he has first begun by collecting as many as possible of the Recent species so that direct comparison can be made with the fossil ones. For this purpose besides those collected by the writer many have been received from Marine Biological Stations and Fisheries Experimental Stations. However, until more than three fourths of the Recent fish fauna of Japan is known as to their respective otoliths, one cannot expect to make a thorough study. In this respect the present report which treats only four species is considered preliminary to further research.

Here the writer thanks Messrs. Jun KATAOKA and Tetsuro OTOMO, graduate students in the Institute of Geology and Paleontology, Tohoku University, Sendai, for their kind offer of specimens. Deep gratitude is due to Professor Yusa KAMBARA of the Kochi University, Shikoku, for the identifiication of the Recent specimens from Tosa Bay, Kochi

* Read, Oct. 1, 1955; received Oct. 29, 1955

Prefecture, Shikoku, which he donated to the writer's study. A part of the expense of the present study was defrayed from the Scientific Expenditure Fund of the Ministry of Education of the Japanese Government.

Occurrence of the Fish Otoliths

The described and illustrated species of fish otoliths were collected from the Pliocene Sakahata, Yanagawa and Kawayatsu formations developed in the north-central part of the Boso Peninsula, Chiba Prefecture in Central Japan. The stratigraphic positions of the mentioned formations according to the stratigraphic order worked out by K. SAKAKURA (1935) is given in Table 1.

Table 1. Stratigraphic Sequence of the Formations as worked out by K. SAKAKURA (1935)

Tsurumai group		Yabu sand. Sand, gravel and silt. Fossiliferous.
		Jizodo sand. Sand intercalating a silt layer. Fossiliferous.
		Kasamori silt. Massive bluish colored silt. Fossiliferous.
		Mandano sand and gravel. Coarse sand with gravels. Fossiliferous.
Satomi group	Ichijuku sand	Koshikiya formation. Alternation of silt and sand. Fossils rare.
		Kawayatsu silt. Massive silt predominating, intercalating sand layers. Fossils common.
		Yanagawa formation. Massive formation. Fossils not common.
		Habusawa formation. Alternation of sand and silt. Fossils absent.
		Sanbonmatsu silt. Massive silt. Fossils rare.
		Hasumi sand. Sand with intercalated silt layers. Fossils common at places.
Nishihata group		Sakahata formation. Alternation of silt and sand. Fossils common at places.
		Kohiragadai silt. Massive silt. Fossils not common.
		Seki formation. Coarse clastic rocks. Fossils common at places.

Description of the Fish Otoliths

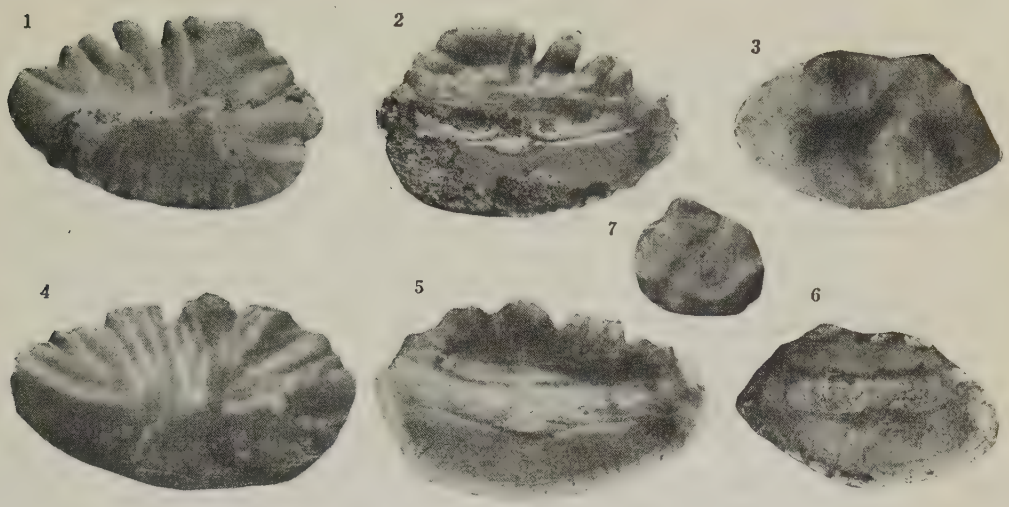
Otolithus (*Limanda*) *otomoi* HATAI, n. sp.

Fig. 7.

Small, circular, measuring 4.5×4.0 mm in diameters. Surface roughened with several corrugatons, undulatory, margins more or less projecting at extremities of radial corrugations. Nucleus, resting and growing zones distinct; nucleus small, central in position, resting zone much narrower than growing zone.

Locality and geological formation:—Upper part of the Sakahata formation at Nishibuta, Otaki-machi, Isumi-gun, Chiba Prefecture. Pliocene. Reg. No. P-301.

Remarks:—Although only one surface



(all enlarged five times natural size)

Figs. 1, 2-*Otolithus* (*Sebastodes*) *kokumotoensis* HATAI, n. sp. 1-inner view. 2-outer view.
Figs. 4, 5-*Otolithus* (*Scombrops*) *kataokai* HATAI, n. sp. 4-inner view, 5-outer view.
Figs. 3, 6-*Otolithus* (*Owstonia*?) *tsukizakiensis* HATAI, n. sp. 3-inner view. 6-outer view.
Fig. 7-*Otolithus* (*Limanda*) *otomoi* HATAI, n. sp. 7-outer view.

of the otolith can be observed, its outline, general size and surface features are close to certain species of *Limanda*, a common flatfish living along the Pacific coast of Northern and Central Honshu. Compared with the ear bones of *Limanda angustirostris* KITAHARA (Reg. No. P-18) collected from Sagami Bay, Kanagawa Prefecture and identified by Mr. Fujio YASUDA of the Fisheries Department, Tokyo University, the present fossil is similar. However, the fossil can be distinguished from the Recent species just mentioned by having smoother margins, stronger radial corrugations and more distinct nucleus, resting and growing zones.

The specific name is dedicated to Mr. Tetsurô OTOMO, one of my former students, who collected the specimen and kindly offered it to me for study.

Otolithus (*Owstonia ?*) *tsukizakiensis* HATAI, n. sp.

Figs. 3, 6.

Transversely subovate, measuring about 8.5 mm in length, 5.0 mm in width and 1.5 mm in thickness. Both dorsal and ventral margins smooth, though the former is provided with several broad folds. Anterior and posterior sides bluntly rounded. Surface roughened, irregular, with about four short, irregularly directed, broadly rounded, non-continuous ridges. Outer side with ill-defined groove, which is shallow with sides parallel and not sharply margined, extending throughout length of ear bone, while surface minutely roughened. Nucleus, resting and growing zones obscure.

Locality and geological formation:—Lower part of the Kawayatsu formation at about 400 meters west of the Primary School at Tsukizaki, Shiratori-mura, Ichihara-gun, Chiba Prefecture. Pliocene. Reg. No. P-302.

Remarks:—The present otolith, although

not complete, resembles *Owstonia grammodon* (FOWLER) (Reg. No. P-67), a Recent fish from off Kochi Prefecture, Shikoku, in outline, thickened aspect, lack of surface sculpture, smooth margins and ill-defined groove. However, the present otolith can be distinguished from the mentioned species by the more extensive groove, rougher surface ridges and by the less angular outline. This fossil otolith was collected by Mr. Tetsuro OTOMO, graduate student of the Institute of Geology and Paleontology, Tohoku University, Sendai.

Otolithus (*Scombrops*) *kataokai*

HATAI, n. sp.

Figs. 4, 5.

Transversely oval in shape, measuring 10.0 mm in length, 6.0 mm in width and 2.0 mm in thickness. Dorsal margin with 13 denticles radiating from central part, of which the eighth and thirteenth are strongest; extremities of each denticle rounded, more swollen dorsally than centrally, separated by much narrower interspaces of varying width. Anterior margin characterized with one, broad, swollen ridge extending posteriorly to about two-thirds length of ear bone, but broken up into four vague, short, swollen, both dorsally and ventrally directed mounds, separated from one another by shallow valleys. Posterior margin with bifurcated and broadly rounded ridge with a small denticle between. Ventral margin with about 17 small denticles including the vague ones, each separated by short but narrow valleys. Inner surface triangularly swollen and the outer side flat in lateral view. Inner side flat with median groove extending throughout length of otolith; groove rounded anteriorly, flaring posteriorly, ventrally expanded centrally, their margins sharp inwardly but raised on their outer parts and gradually sloping ventrally and dorsally. Nucleus, growing and resting zones obscure.

Locality and geological formation:—Upper part of the Sakahata formation below the Primary School at Otadai, Oikawa-mura, Isumi-gun, Chiba Prefecture. Pliocene. Reg. No. P-300.

Remarks:—The described specimen seems to be assignable to the genus *Scombrops* and can be distinguished from *Scombrops boops* (HOUTTUYN) (Reg. No. P-115), a Recent fish from off the Boso Peninsula, Chiba Prefecture, which was identified by the writer. Compared with the Recent species, the fossil one is much thicker, less curved, with stronger denticles, less projecting anterior margin and with broader and less curved groove.

This otolith is named after Mr. Jun KATAOKA, a graduate student of the Institute of Geology and Paleontology, Tohoku University, Sendai, who collected the type.

Otolithus (*Sebastodes*) *kokumotoensis*

HATAI, n. sp.

Figs. 1, 2.

Transversely oval in shape, measuring 9.5 mm in length, 5.5 mm in width and about 1.8 mm in thickness. Dorsal margin with nine teeth, roughly separable into anterior and posterior halves, the former consisting of three narrow and long denticles separated from one another by grooves dorsally and by narrow valleys ventrally, and the latter of five more or less fused denticles of varying breadth and separated by shallow, narrow valleys; extremities of teeth rounded, more sharply on anterior than on posterior half. Anterior side characterized with bluntly rounded margin

formed of three blunt denticles. Posterior side with two broadly rounded, bluntly pointed denticles, one dorsal and the other ventral to median line. Ventral margin with 16 narrowly rounded denticles including the vague ones, of them the posterior- and anterior- most are strongest, separated by narrow valleys. Both dorsal and ventral teeth gradually rise towards to central area to form a more or less low triangular ridge in lateral view. Outer side almost flat, incised with broad, nearly straight groove extending throughout length of ear bone, expanding at both anterior and posterior extremities, inner margin rather sharp, more or less rounded, ventrally incised near middle of length, outwardly raised but gradually lessening in height towards dorsal and ventral margins. Nucleus, resting and growing zones obscure.

Locality and geological formation:—Upper part of the Yanagawa formation in a cliff north of the second tunnel bordering the road leading from Tsukizaki station to the village of Okubo, Shiratori-mura, Ichihara-gun, Chiba Prefecture. Pliocene. Reg. No. P–303.

Remarks:—The described and figured specimen resembles in several features *Sebastodes schlegelii* (HILGENDORFF) (Reg. No. P–55) collected from Mutsu Bay, Aomori Prefecture, but has a thicker, less curved ear bone with stronger teeth and more rounded anterior and posterior sides. Also the groove of the present otolith is more extensive and stronger.

PUBLICATIONS RECEIVED (15)

1234. CRETTAZ, P.: Geologische Untersuchungen an der Alpen-Apennin Grenze in Ligurien (Italien). Mitt. Geol. Inst. Eidg. Techn., Univ. Zurich, Serie C, Nr. 61 1955.
1235. HEIERLI, H.: Geologische Untersuchungen in der Albula zone zwischen Crap Alv und Cinuos-chel (Graubünden). (Inaugural-Diss. Erl. Phil. Dokt. Phil. Fak. 11, Univ. Zürich). Ibid., Ser. C, Nr. 62, 1955.
1236. JÄCKLI, H.: Geologische und hydrologische Vorstudien für eine Wirtschaftsplanung in Afghanistan. Ibid., Ser. C, Nr. 63, 1955.
1237. Anthropozoikum IV 1954.
1238. COOPER, G. A.: New Cretaceous Brachiopoda from Arizona, Smiths. Misc. Coll., Vol. 131, No. 4, 1955.
1239. 静岡大学文理学部研究報告〔自然科学〕, No. 6, 1954.
1240. Reports of the Liberal Arts Faculty, Sizuoka Univ., 〔Nat.. Sc.〕 No. 7, 1955.
1241. Ibid., No. 8, 1956.
1242. DURHAM, J. W.: Classification of Clypeasterioid Echinoids, Univ. Calif. Publ. Geol. Sc., vol. 31, No. 4, 1955.
1243. WILLIAMS, H. & H. MEYER-ABICH: Volcanism in the Southern Part of El Salvador, Ibid., Vol. 32, No. 1, 1955.
1244. KELLOGG, R.: Three Miocene Poroises from the Calvent Cliffs, Maryland, Proc.. Unit. National Museum, Vol. 105, No. 3354, 1955.
1245. GAZIN, C. L.: Paleocene Mammalian Faunas of the Biscon Basin in South-Central Wyoming, Smiths Misc. Coll., vol. 131, No. 6, 1956.
1246. Jour. Fac. Sc., Hokkaido Univ., Ser. IV, Geol. & Mineral, Vol. IX No. 3, 1956.
1247. Jour. Earth Sc., Nagoya Univ., Vol. 4, No. 1, 1956.
1248. DOWNS, Th.: The Mascall Fauna from the Miocene of Oregon, Univ. Calif. Publ. Geol. Sc., Vol. 31, No. 5, 1956.
1249. McLEARN, D. J.: Devonian Formations in the Alberta Rocky Mountains between Bow and Athabasca Rivers, Geol. Surv. Canada, Bull. 35, 1955.
1250. JINGHWA HSU, K.: Granulites and Mylonites of the Region about Cucamonga and San Antonio Canyon, San Gabriel Mountains, California, Univ. Cali. Publ. Geol. Sci., Vol. 30, Mo. 4, 1955.
1251. SAVAGE, D. E.: Nonmarine Lower Pliocene Sediments in California. A Geochronologic-Stratigraphic Classification, Ibid. Vol. 31, No. 1, 1955.
1251. Collecting and Breeding, Vol. 18, No. 7, 1956.
1253. STOCK, C.: Mammalian Fauna from the Titus Canyon Formation, California, Carnegie Inst, Publ. 584, 1949.
1254. ARNOLD, Z. M.: The Contributions of Jean le Calveg to the study of the Foraminifera, Contr. Cushman Foundation for Foraminiferal Research, Vol. VIII, Pt. 1, 1956.
1255. ——— : The construction and use of a single die for plastic micropaleontological studies, Micropaleontology, Vol 1, No. 4, 1955.
1256. LANGSTON, W. & J. W. DURHAM: A Sauropod Dinosaur from Columbia, Jour. Paleont., Vol. 29, No. 6, 1955.
1257. TISCHLER, H.: A New Mississippian Tetracoral from Death Valley, California, Ibid. Vol. 30, No. 1, 1956.
1258. DURHAM, J. W.: Insect Bearing Amber in Indonesia and the Philippine Islands, Pan-Pacific Entomologist, Vol. 32, No. 2, 1956.
1259. ——& R. H., JAHNS, D. E. SAVAGE : Marine-Nonmarine relationships in the Cenozoic section of California, Cont. Mus. Palaeont. Univ. Calif., No. 664, 1956.

Trans. Proc. Palaeont. Soc. Japan, N. S., No. 23, pp. 219—220, 1 text-fig., Aug. 31, 1956

292. A NEW SPECIES OF *LINGULA* FROM HOKKAIDO, JAPAN*

ICHIRO HAYASAKA

Geological Institute, Saitama University

and

KOTORA HATAI

Department of Geology, Faculty of Education, Tohoku University, Sendai

北海道産 *Lingula* の一新種：北海道空知郡滝川町赤平で行われたボーリングのコアー（深さ 125 m, 漸新世, 幌内層）から *Lingula* の新種を発見したので *Lingula akabiraensis* と命名して記載した．

早坂一郎・畑井小虎

Although marine Cenozoic rocks are extensively developed in the Japanese Islands, records of the occurrence of *Lingula* are but few. According to K. HATAI (1954), the genus has been illustrated on specimens from the Pleistocene deposits of Tokyo and from the Pliocene rocks of Miyagi Prefecture, but not from elsewhere in Japan. The mention of the genus in lists accompanying different articles on geology were left out of consideration because the details remain to be known only by persons who have access to the original specimens, which have been largely destroyed or misplaced by causalities and moved to a place of safety during the World War II.

The discovery of several specimens of a new species of *Lingula* from a dark colored, compact, more or less carbonaceous siltstone from a boring core (labelled No. 15) at about 125 meters in the Akabira colliery in Takikawa-machi, Sorachi-gun, Ishikari Province in Hokkaido, is described in this article. The siltstone evidently belongs to the Oligocene Poronai formation (K. HATAI-Y. KAMADA, 1950).

Text-figure 1. *Lingula akabiraensis* n.sp. Holotype. ×5

The specimens are all of small size, still retaining their original chitinous shell covering and thus revealing the details of surface sculpture. However, upon exposure the shell material easily detaches itself from the siltstone and is thus easily lost. The original coloration is not preserved and there is no evidence for judging what it may have been.

*Read and received Oct. 29, 1955

Lingula akabiraensis HAYASAKA and HATAI, n. sp.

Text-figure 1.

Shell small in size, measuring about 8.0 mm in length and 4.0 mm in maximum width, moderately convex, elongate, narrowly oblong; sides nearly parallel with each other, tapering anteriorly and posteriorly, tapering rather abruptly toward the straight anterior margin, while quite acutely toward the beak which is roundly pointed posteriorly. Surface covered with microscopic growth-lines which become strong at lateral sides where they appear as gentle corrugations and at anterior margin they appear as mere periodic weak undulations. Anterior margin short, straight, with aspect of very slight indentation, rather abruptly passing into tapering lateral sides.

Locality and geological formation.—Akabira, Takikawa-machi, Sorachi-gun, Ishikari Province, Hokkaido: 125 meters underground. Poronai formation: Oligocene. Preserved in the collection of the Department of Geology, Faculty of Education, Tohoku University, Sendai. Reg. No. 3001 (Holotype), Reg. No. 3002 (Paratypes).

Remarks.—The present species is in its preserved features similar to Fig. 4 of T. DAVIDSON's *Lingula anatina* (1888, pl. 29, fig. 4), a species which is now known as *Lingula unguis* LINNAEUS. However, the more acutely pointed posterior region of the shell, narrower outline, shorter anterior margin and more strongly tapering lateral sides near the anterior margin all serve to distinguish the present species from the well-known and rather widely distributed *Lingnla unguis*. There appear to be no other species with which the present one can be compared.

Beside the holotype, there are several paratype specimens which agree with the type in all preserved features, but none of them exhibit the characters of the muscular scars, in spite that a few had part of their test broken during breaking of the entombing rock. This may suggest that the muscular scars may have been weak.

From the evidence that the lingulids are embedded in a dark colored, fine grained siltstone in which carbonaceous matter is common, and no other fossils occur in association, it may be suggested that the conditions prevailing at the time the brachiopods flourished, was not favorable to other marine animals. The sea bottom having a considerable amount of carbonaceous matter is generally not a suitable environment for other kinds of animals. *Lingula*, however, is known to survive in conditions which would be fatal to other animals (K. HATAI, 1949, pp. 183–186).

References

DAVIDSON, T. (1888), A Monograph of Recent Brachiopoda. *Trans. Linn. Soc. London, Second Ser. Zoology, vol. 4, pt. 3*, pp. 205, 215, pl. 29, figs. 1–8 (compare with fig. 4).

HATAI, K. (1940), Cenozoic Brachiopoda of Japan. *Sci. Rep. Tohoku Imp. Univ., Ser. 2, Geology, vol. 20*, pp. 183–186.

HATAI, K. (1950), Check List of Japanese Tertiary and Pleistocene Brachiopoda. *Sci. Rep. Tokyo Kyoiku Daigaku, Sec. C, vol. 3, no. 21*, pp. 99–139.

HATAI, K., and Y. KAMADA (1950), Fossil Evidence for the Geological Age of the Uchigo Group, Jôban Coal-field. *Short Papers, Inst. Geol. Pal., Tohoku Univ., no. 2*, pp. 58–73.

Trans. Proc. Palaeont. Soc. Japan, N.S., No. 23, pp. 221—224, Pl. 31, Aug. 31, 1956

293. ON THE MIOCENE PECTINIDAE FROM THE ENVIRONS OF SENDAI; PART 8, ON *PECTEN* (*PATINOPECTEN*) *KIMURAI MATUMORIENSIS* NAKAMURA*

KÔICHIRÔ MASUDA

Department of Geology, College of Education, Tohoku Univereity, Sendai

仙台附近中新統産 *Pectinidae*, その 8. *Pecten* (*Patinopecten*) *kimurai matumoriensis* NAKAMURA について： 筆者は本種の模式地からの多数の標本について検討した結果，これは *P. kimurai* の亜種としてではなく，*Patinopecten* の種として取扱うべきであると考え，再記載を行い，更に地質学的な意義に簡単に触れた。 増田孝一郎

Introduction and Acknowledgements

Pecten (*Petinopecten*) *kimurai matumoriensis* was first described by M. NAKAMURA (1940) from the Nanakita formation at Matsumori, Izumi-mura, Miyagi-gun, Miyagi Prefecture in the northern border of Sendai City. This species, so far as literature is concerned, is known only from the type locality and places nearby Sendai. Abundant specimens of this species which is one of the largest among the Miocene Pectinidae from Japan, were collected by the writer with the assistance of some students of the College of Education, Tohoku University, from a pebbly conglomerate at the lowermost part of the Nanakita formation.

The writer studied numerous specimens of this species and compared them with the related species which are now preserved in the collections of the Department of Geology of the College of Education, the Institute of Geology and Paleontology, Faculty of Science, both of the Tohoku University, and of the Saito Ho-on kai Museum, all in Sendai City. The results of comparative study lead the writer to consider the present species to be of specific ranking.

In this article is presented a redescription of this species based upon the specimens collected from the type locality, and a discussion of its relationship with related species. The geological significance, so far as can be judged from field data, is also given with regard to this species.

Acknowledgements are due to Dr. Kotora HATAI of the Department of Geology, College of Education, Tohoku University, for kindly supervising the present work. Thanks are also due to the students of the College of Education, Tohoku University, who assisted in the collection of specimens.

Description

Family Pectinidae

Subfamily Pectininae

Genus *Patinopecten* DALL, 1898

Patinopecten matumoriensis (NAKAMURA)

Pl. 31, Figs. 1, 2a–b, 3a–b, 4.

* Read at the 62nd meeting of the Society at Tokyo, Oct. 29, 1955; received Oct. 29, 1955.

1937. *Pecten* (*Patinopecten*) *kimurai* Yokoyama, Nomura and Hatai, *Saito Ho-on Kai Mus., Res. Bull., No. 13*, p. 130, pl. 19, fig. 5.

1940. *Pecten* (*Patinopecten*) *kimurai* Yokoyama, *matumoriensis* Nakamura, *Japan Jour. Geol. Geogr., Vol. 17, Nos. 1-2*, p. 13, pl. 1, figs., 1, 2 pl. 2, figs. 1-3.

The original description of this species is as follows:

Shell large in size, circular in outline, much compressed. Valves sculptured by 10–12 strong, radial ribs, which are rather sharply elevated, round on top and nearly equal to or a little narrower than its interspaces. Interspaces smooth on both bottom and sides; otherwise similar to *P. kimurai*. Length 146.5 mm., width 145.2 mm., depth of intact valves 34.5 mm.

The enlarged collection now permits a more detail description as given below.

Shell very large in size, thick, orbicular in outline, equilateral except for auricles; right valve more convex than the left; both valves radiately ribbed and forming an angle of about 100° at apex.

Right valve gently convex, with 10–14 stout, round-topped radial ribs and fine concentric growth lines; radial ribs much broader than their interspaces in breadth near the beak, but nearly equal to or a little broader at the lower half of disc, and they tend to become obsolete towards the antero-posterior dorsal margins; the radial ribs on anterior dorsal side rather more distinct than that of posterior side. Left valve nearly flat or a little convex, with 10–14 distinct radial ribs which are much narrower than their interspaces in breadth and with fine concentric growth lines, and ornamented by obtuse network in the younger shells; radial ribs sharp near the beak and tend to become rounded towards the ventral margins, and that of anterior side usually more distinct than that of the posterior side. Auricles of right valve very large, subequal in size, though the anterior is a little larger than the posterior, and a little folded upwards near the dorsal margins; anterior auricle furnished with wide and shallow byssal notch, and ornamented by concentric lines and a few very faint radial threads; posterior with sculpture similar to the anterior. Anterior auricle of the left valve a little larger than the posterior, sculptured with fine concentric lines and a few faint radial threads, and slightly folded downwards near the dorsal margins; posterior auricle with sculpture similar to the anterior auricle. Hinge of the right valve with distinct cardinal crura, and wide and deep resilial pit provided with short, low, fine lateral ridges which are gently curved inwards. Left valve with hinge provided with shallow sockets corresponding to the lateral ridges of right valve. Interior surface of both valves gently folded corresponding to the exterior sculpture.

Dimensions (in mm.):—

Valve	Right	Right	Right	Left	Left	Left
Height	ca. 140	—	132	145	130	120
Length	140	137	—	150	145	132
Hinge-length	80	ca. 77	70	75	78	78
Depth	25	24	20.5	18	16	—
Apical angle	100°	100°	100°	100°	110°	110°

Remarks:—This species is characterized by the larger, orbicular and inequivalved shell, about 12 stout, round-topped radial ribs, conspicuous large auricles which are slightly folded upwards near the dorsal margins, and distinct cardinal crura in the right valve, and by the much narrower radial ribs which are sharp near the beak and rounded at lower half of disc, larger auricles which are slightly folded downwards near the dorsal margins, and cardinal crura in the left valve. The radial ribs of both valves usually tend to become obsolete towards the dorsal margins, but radials on the anterior submargins are more distinct than that of the posterior.

This species was originally described as a subspecies of *Patinopecten kimurai* (Yokoyama) by M. Nakamura (1940), but it is easily distinguishable from *kimurai* by the larger and thick shell, a little more number of radial ribs, no striae on the backs and flanks of radial ribs in the right valve, much larger auricle which are slightly folded near the dorsal margins, and the characteristics of hinge area. From the above mentioned characteristic features the writer considers that the present species should be placed in specific rank.

S. Nomura and K. Hatai described *Pecten* (*Patinopecten*) *kimurai* Yokoyama (1937, p. 130, pl. 19, fig. 5) from the Nanakita formation at Matsumori, but examination of the specimen, which is preserved in the collection of Saito Ho-on Kai Museum, shows that it should be refered to *matumoriensis*.

This species appears to be related with the Pliocene *Fortipecten takahashii* (Yokoyama) (H. Yabe and K. Hatai, 1940, pp. 147–160, pls. 34–35) in having a large and thick shell, 7–14 radial ribs, and large auricles, but the latter is distinguishable from the present species by greater convexity of the right valve, 7–14 radial ribs which are much narrower than interspaces on the both valves, weak radial riblets on the valves, much larger auricles, and cardinal crura. This species is also related to *Pecten* (*Fortipecten*) *hallae* Dall (MacNeil, Mertie and Pilsbry, 1943, pp. 86–87, pl. 12, figs. 1, 2, pl. 13, fig. 1) described from the Pliocene Buried Beach near Nome in Alaska. The Alaskan species differs from the Japanese one in having a more inflated shell and radial ribs broader than their interspace in the right valve, and in having numerous fine riblets in the interspaces and submargins in the left valve. *Patinopecten ibaragiensis* Masuda (K. Masuda, 1953, pp. 41–46, pls. 5–6) described from Hitachi City, Ibaragi Prefecture more or less resembles this species, but it is distinguishable from the present one by the smaller shell, smaller auricle, and greater number of low and flat radial ribs of the right valve, and by the numerous, faint radial riblets of the left valve.

Geological Significance

The present species, which is restricted in distribution to the type locality and several places nearby, was also found in the uppermost part of the Aoso formation at Nagashiba, Tomiya-mura, Kurokawa-gun, Miyagi Prefecture and a few questionable specimens were obtained from the Ôtsutsumi formation at Dôdokoro, Izumi-mura, Miyagi-gun, all in northern border of Sendai. These formations are all Miocene in age.

Although *P. matumoriensis* is abundant in the pebbly conglomerate of the lowermost part of Nanakita formation at Matsumori, it become fewer towards the north. This decrease in number may be due to the change in environmental

conditions, being favorable at Matsumori and nearby, but less so elsewhere, though there appears no remarkable change in lithology in this horizon. The water action is considered to have been stronger at Matsumori and its environs than the northern area.* As *Chlamys kaneharai* (YOKOYAMA), which is the characteristic species of this horizon, is abundant and widely distributed, it is considered that *P. matumoriensis* was more sensitive.

From the above mentioned it is considered that the distribution of *matumoriensis* was influenced by physical rather than bottom conditions.

The present species is restricted in its geological range to the Early Miocene.

References

MACNEIL, F. S., MERTIE, J. B. and PILSBRY, H. A., (1943), Marine Invertebrate Faunas of the Buried Beaches near Nome, Alaska. *Journ. Paleont., Vol. 17, No. 1*, pp. 86-87, pl. 12, figs. 1, 2, pl. 13, fig. 1.

MASUDA, K. (1953), A New Species of *Patinopecten* from Ibaragi Prefectnre. *Short Papers, IGPS, No. 5*, pp. 41-46, pl. 5, figs. 1-5, pl. 6, figs. 1-5.

NAKAMURA, M. (1940), On Some Pectinidae Fossils from the Miocene Deposits of the Tomiya Block, Miyagi-ken, Northeast Honsyû, Japan. *Japan. Jour. Geol. Geogr., Vol. 17, Nos. 1-2*, pp. 13-14, pl. 1, figs. 1-2, pl. 2, figs. 1-3.

NOMURA, S. and HATAI, K. (1937), A List of the Miocene Mollusca and Brachiopoda collected from the Region lying North of the Nanakita River in the Vicinity of Sendai, Rikuzen Province, Japan. *Saito Ho-on Kai Mus., Res. Bull., No. 13*, p. 130, pl. 19, fig. 5.

YABE, H. and HATAI, K. (1940), A Note on *Pecten* (*Fortipecten*, subg. nov.) *takahashii* YOKOYAMA and Its Bearing on the Neogene Deposits of Japan. *Sci. Rep., Tohoku Imp. Univ., Ser. 2, Vol. 21, No. 2*, pp. 147-160, pls. 34 35.

YOKOYAMA, M. (1925), Molluscan Remains from the Uppermost Part of the Jô-ban Coal-Field. *Jour. Coll. Sci., Imp. Univ. Tokyo, Vol. 45, Art. 5*, p. 27, pl. 2, fig. 4, pl. 4, figs. 1-6.

* K. MASUDA: On the Miocene Pectinidae from the Environs of Sendai; Part 7, On *Pectan kaneharai* YOKOYAMA. *Trans. Proc. Palaeont. Soc. Japan* (in press).

Explanation of Plate 31

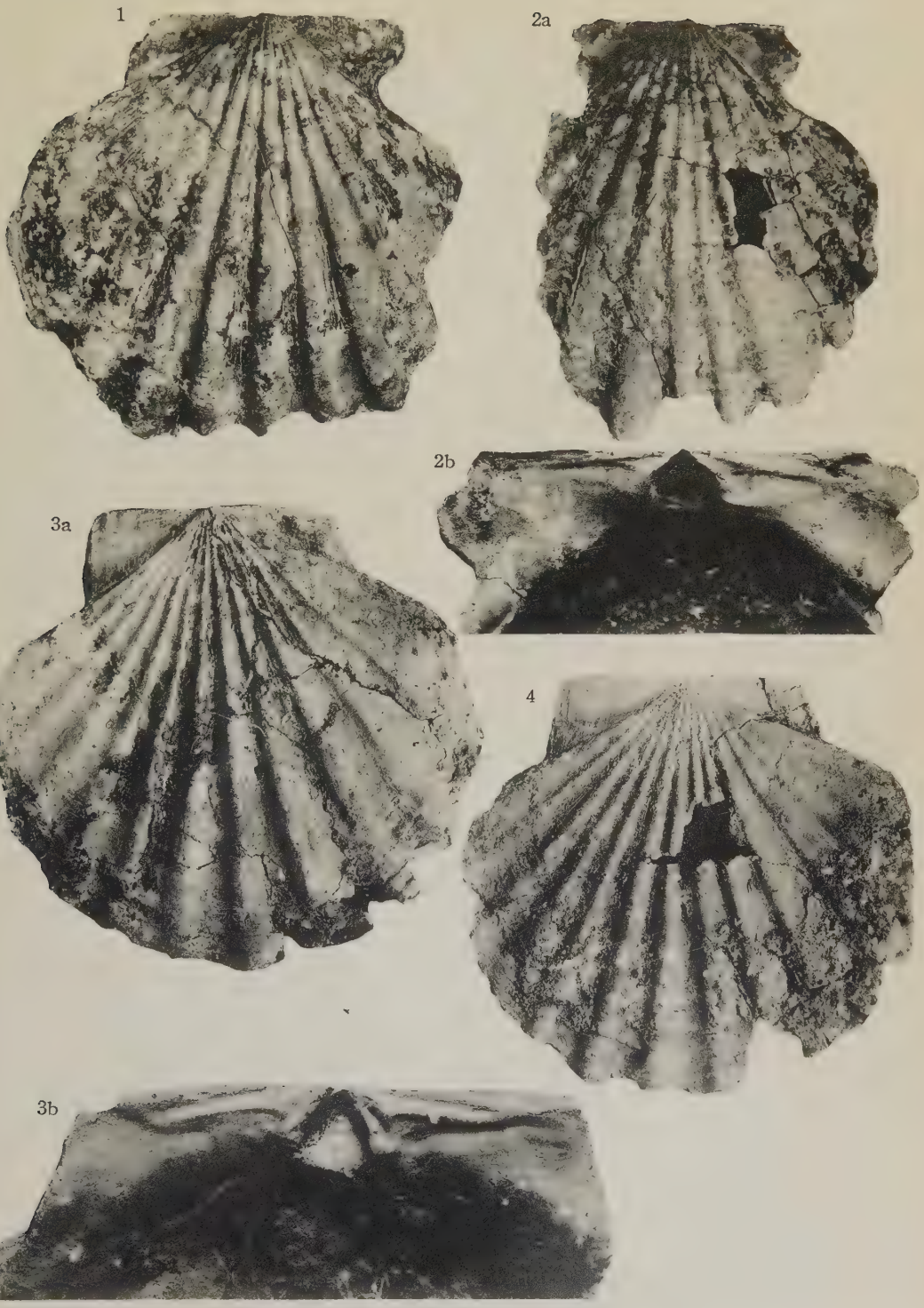
Patinopecten matumoriensis (NAKAMURA)

Fig. 1. Right valve, ×1/2. DGS, Reg. No. 1961. Loc. Matsumori, Izumi-mura, Miyagi-gun, Miyagi Prefecture.

Figs. 2a-b. a, Right valve, ×1/2. b, Hinge area of 2a, ×1. DGS, Reg. No. 1960. Loc. Same as above.

Figs. 3a-b. a, Left valve, ×1/2. b, Hinge area of 3a, ×1. DGS, Reg. No. 1961. Loc. Same as above.

Fig. 4. Left valve, ×1/2. DGS. Reg. No. 1960. Loc. Same as above.



K. Kumagai, Photo.

Trans. Proc. Palaeont. Soc. Japan, N.S., No. 23, pp. 225—228, Pl. 32, Aug. 31, 1956

294. ON SOME NEW SPECIES OF *RAUSERELLA* FROM MT. IBUKI, SHIGA PREFECTURE, CENTRAL JAPAN*

MANABU KOBAYASHI

Tokyo University of Education

滋賀県伊吹山に産する *Rauserella* の新種について：滋賀県伊吹山石灰岩層中に *Neoschwagerina* と共存する *Rauserella* を発見したので，その地質学的生存期間と新種の記載を報告する。　小林　学

Since 1953, the writer has been engaged in a study of the stratigraphy and paleontology of Mt. Ibuki, Shiga Prefecture, Central Japan. As one of the results, the fusulinid zones distinguished in the Ibuki-yama limestone formation were found to correspond to the zones of *Acervoschwagerina* to the lowest *Yabeina*. At the time, some new species of *Rauserella* were discovered in a horizon lower than that in which the genus was hitherto believed to be confined. This fact is interesting when considering the range of the genus *Rauserella*.

The writer wishes to thank Professors Haruyoshi FUJIMOTO and Kotora HATAI, of the Institute of Geology and Mineralogy, Tokyo University of Education, for their kind advice and encouragement with regard to the present paper.

The genus *Rauserella* was defined by DUNBAR (1944) as a fusulinid with irregulary coiled outer volutions in the mature stage. It was assigned with some question to the Ozawainellinae by THOMPSON, who concluded that its aberrant nature indicates that the particular group is near "the end of life history". *Rauserella erratica* the genotype and previously the only known species of the genus was reported by DUNBAR (1944) from the upper Guadalupian of America.

The only records of the occurrence of *Rauserella* in Japan are there by KANMERA and MORIKAWA. KANMERA (1954) described *Rauserella* sp. from the Kuma formation in Kyushû, where it is associated with *Yabeina columbiana* (DAWSON), *Y. yasubaensis* TORIYAMA, *Y. gubleri* KANMERA, *Lepidoliua toriyamai* KANMERA, *L. kumaensis* K., *Pseudodoliolina pseudolepida* var. *gravitesta* K., *Codonofusiella cuniculata* K., *Dunbarulla ?* sp., *Schwagerina* aff. *acris* THOMPSON & WHEELER and *Schwagerina pseudocrassa* K. These fossils indicate that the geological age of *Rauserella* sp. is upper Permian, or precisely the *Yabeina* zone. MORIKAWA described a form of *Rauserella* from the *Yabeina* zone of the Kanto massif. From these it may be inferred that the geological range of *Rauserella* is restricted to the zone of *Yabeina* in Japan as in America.

The geological distribution of *Rauserella* on Mt. Ibuki is rather wide, but owing to that the number of specimens is few it was difficult to obtain well oriented sections. However, the asso-

* Read June 18, 1955; received Nov. 1, 1955.

ciated species in the present field were distinguished to compare; *Neoschwagerina* sp., *Parafusulina sapperi* (STUFF), *Schwagerina japonica* (GÜMBEL), *Pseudofusulina* sp., *Codonofusiella* sp. Judging from these associated species, it can be considered that the geological range of *Rauserella* is not only restricted the upper Permian, or the zone of *Yabeina*, but that its lower limit extends down to the zone of *Neoschwagerina*.

Descriptions of species

Genus *Rauserella* DUNBAR, 1944

Rauserella fujimotoi KOBAYASHI, n. sp.

Pl. 32, figs. 1–7.

Shell minute, irregularly coiled and irregularly ellipsoidal in form. The length and width of the last volution are about 1.4 mm. and 0.88., respectively, its form ratio is 1.6. The earlier two to three volutions are planispiral and discoidal in shape with a subangular periphery, and short axis of coiling. Beyond these volutions, the axis of coiling changes its position irregularly, and that of the last volution becomes perpendicular to the earlier ones. The proloculus is minute, measuriug 52 to 72 microns in outer diameter. The shell expands gradually in the earlier volutions, but sharply in the outer ones.

The spirotheca is very thin and composed of tectum, diaphanotheca and inner tectorium in outer volutions, which are obscure in inner volutions, its thickness is 14 to 22 microns in the first to fourth volutions. The septa thin, numbering 11 and 11 in the third to fourth volutions, respectively.

The chomata are not evident in the outer volutions but can be faintly observed in the inner discoidal volution.

Remarks: The inner discoidal, planispiral volutions, irregular axis of coiling and aberrant outer form of the present species refer it to the genus *Rauserella*. The present species is easily distinguished from *Rauserella erratica* DUNBAR by its outer shape; expanded form, minute size, shorter axis of coiling, and sharper periphery in the earlier volutions.

Locality and Occurrence: This species is found in the Ibuki-yama limestone formation at the ridge about 500 m. to the northeast of Ibuki-yama. It is associated with *Parafusulina sapperi* (STUFF), *Pseudofusulina* sp., *Codonofusiella* sp. and *Schubertella kingi* DUNBAR & SKINNER.

Results of measurements:

Reg. No. 20501

Loc. No. H-32.

	Pro.	V. 1	V. 2	V. 3	V. 4	V. 5	V. 6
Height of volution		35	70	88		105	168
Thickness of spirotheca	11	16	22	22	17	17	22

Reg. No. 20502

Loc. No. H-32.

	Pro.	V. 1	V. 2	V. 3	V. 4
Height of volution		45	83	61	112
Thickness of spirotheca	14	14	14	17	17

(in microns)

Rauserella sp.

Pl. 32, figs. 8–9.

Shell minute, irregularly elongate in form, axis of coiling irregular. The

shell of three and half volutions about 1.4 mm. long, and 0.6 mm. wide, its form ratio about 2.4. The inner one and half volutions are involute discoidal, planispiral with subangular periphery. The axis of coiling in the earlier volutions is short, but thereafter the inner one elongates rapidly and becomes perpendicular to the earlier axis of coiling. The proloculus is minute and measures 105 to 145 microns in outside diameter. The height of chambers of the first to fourth volutions are 88, 106, 53 and 123 microns, respectively.

The spirotheca very thin, its structure obscure but seems to be composed of tectum, diaphanotheca and lower tectorium in outer volutions. The total thickness of first to third volutions 17, 22 and 22 microns, respectively. The septa more thinner than spirotheca, unfluted throughout the shell.

The chomata are observed faintly only in the inner volutions.

Remarks: *Rauserella* sp. resembles more closely *Rauserella fujimotoi* n. sp. than *Rauserella erratica* DUNBAR in the following points; subangular periphery and smaller size of the inner volutions, more elongate in form, larger proloculus. Unfortunately, the writer has been able to make only two axial sections and no cross sections, therefore specific naming has been withhold.

Locality and Occurrence: The specimens occur in the Ibuki-yama limestone formation at the ridge about 250 m. to the west of the top of Mt. Ibuki, where it is associated with *Neoschwagerina* sp., *Schwagerina japonica* (GÜMBEL), *Parafusulina sapperi* (STUFF) and *Schubertella* cf. *phairayensis* (COLANI).

Rauserella ? sp.

Pl. 32, fig. 10-12.

Shell rather large for the genus, elongate irregular in form, shell of five volutions, 2.6 mm. long and 0.83 mm. wide; its form ratio is 3.2. Inner volutions ellipsoidal in form, next gradually becoming elongate ellipsoidal, the last irregular in outer shape. Proloculus minute, its outside diameter 12 microns, height of volutions of the second to fourth volution are 95, 106 and 145 microns, respectively.

Spirotheca thin, probably composed of tectum, diaphanotheca and inner tectorium, 16 microns in total thickness and almost uniform throughout. The septa unfluted, chomata uncertain.

Remarks: The two following characters of the present specimens as, lacking inner discoidal volutions and the unchangings axis of coiling do not suffice for placing the specimen in the genus *Rauserella*. Considering the irregular outer volutions, appearance of septa, and the structure of spirotheca, it is evident that the present specimens are closer to *Rauserella* than to any other known genus of the Fusulinidae. Therefore, the writer tentatively refers them to *Rauserella*.

Locality and Occurreuce: From the Upper Ibuki-yama limestone formation, at the ridge about 200 m. to the west of the top of Mt. Ibuki, where it is associated with *Schubertella* sp. and *Pseudofusulina* sp..

References

KANMERA, K. (1954), Fusulinids from the Upper Permian Kuma Formation, Southern Kyushû, Japan, with Special Reference to the Fusulinid zone in the Upper Permian of Japan. *Mem. Fac. Sci., Kyushu Univ., Ser. D, Vol. IV*, pp. 4-5, Pl. 3, fig. 13.

MORIKAWA, R. (1955), Schwagerininae in the Vicinity of the Shomaru Pass, Eastern

Part of Kanto Mountainland, Central Japan. *Sci. Rep., Saitama Univ., Ser. B, Vol. II, No. 1*, p. 61.

THOMPSON, M.L. (1948), Studies of American Fusulinids. *Univ. Kansas Paleont. Cont., Protozoa, Art. I*, p. 32, Pl. 3, figs. 1–5.

Explanation of Plate 32

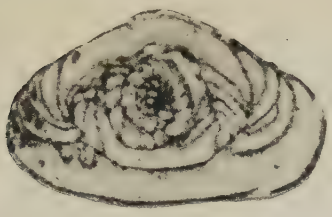
Figs. 1-7, *Rauserella fujimotoi* KOBAYASHI n. sp.
1. Axial section of holotype, Reg. No. 20501
2, Sagittal section of paratype, Rag. No. 20502
3-4, Excentric sections of paratypes, Reg. No. 20503, 20504
5-7, Tangential sections of paratypes, Reg. No. 20505, 20506, 20507

Figs. 8-9, *Rauserella* sp.
8, Axial section, Reg. No. 20508
9, Oblique section, Reg. No. 20509

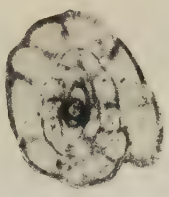
Figs. 10-12, *Rauserella* ? sp.
10, Tangential section, Reg. No. 20510
11-12, Axial sections, Reg. No. 20511, 20512

1-10 (× 30), 11-12 (× 20)

(All of the specimens are deposited in the collection of Tokyo University of Education)



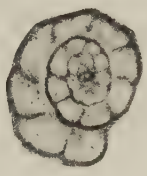
1



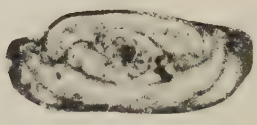
2

6

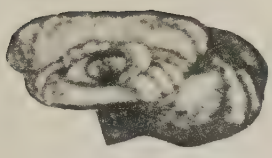
5



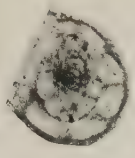
3



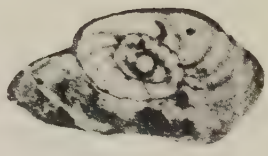
7



8

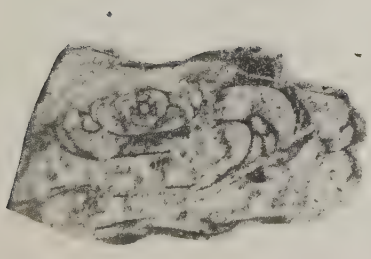


4

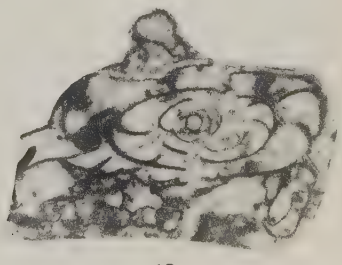


9

10



11



12

Trans. Proc. Palaeont. Soc. Japan, N. S., No. 23, pp. 229—234, Pl. 33, 1 text-fig., Aug. 31, 1956

295. A FOSSIL FAUNA FROM THE NORTHERN PART OF THE TANZAWA MASSIF

MATSUTARO SHIBATA*

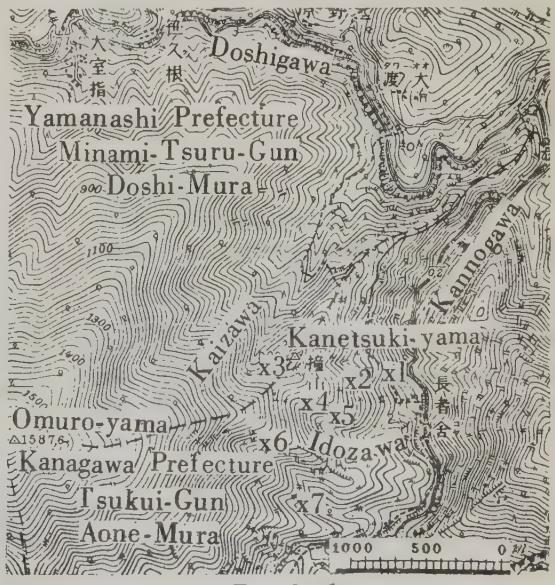
Kyōbashi Upper Secondary Chemical School

丹沢山塊北部の化石について： 1954年夏，筆者は，丹沢山塊北部を調査する機会をえた．その際，かつて三土が化石を採集した地点，および，その附近から，次のような動物化石を採集した．そのうち，一種は新種と思われるので報告する．*Chlamys kaneharai* (YOKOYAMA), *Chlamys kannogawaensis* nov. sp., *Lima* (*Lima*) cfr. *konnoi* OTUKA, *Venericardia* sp. indet., *Haliotis* sp. indet., Spines of Echinoidea, Smaller-foraminiferas, Calcareous algae, etc. 柴田松太郎

In the course of study on the geology of the northern part of the Tanzawa massif since the summer of 1954, the writer collected several molluscan fossils which are described herein. The area surveyedis situated at the south-western end of the geological map of Hachiōji (1: 75,000). At the south-western end of this area, around Kanetsuki-yama, several new fossil localities were found. All of the localities seem to occupy the middle part of the undifferentiated Misaka series of MITSUCHI (1932), however, the precise stratigraphic position is not yet to be worked out

Acknowledgements

For suggestions and help in many ways the writer wishes to thank the following gentlemen. Prof. Haruyoshi FUJIMOTO of the Institute of Geology and Mineralogy, Tokyo University of Education for the permission to study in the Institute. Messrs. Masae ŌMORI and Shigeru AOKI of the same Institute, Mr. Kiyoshi KOIKE of the Geological Institute, University of Tokyo, Mr. Keizō MIKAMI of the Geological Institute, Faculty of Liberal Arts, Yokohama National University, Mr. Yukio KUWANO of the Research Institute for Natural Re-



Text-fig. 1.
Map showing the fossil localities.

* Read June 18, 1955; received Nov. 19, 1955.

sources, and to Mr. Reiji SHINOKI of the Fukada Geological Institute. Prof. Kotora HATAI for kindly reading this manuscript.

Fossil localities and Mode of Occurrence

The fossil localities are all situated around Kanetsuki-yama above mentioned (Text-fig. 1.). Some of these localities have previously been recorded by MITSUCHI, who reported on the occurrence of:—

Pecten sp. from Kaizawa, eastern foot of Ōmuro-yama, Dōshi-mura, Minamitsuru-gun, Yamanashi Prefecture; Halfway up the east side of Kanetsuki-yama, Aone-mura, Tsukui-gun, Kanagawa Prefecture,

? *Pholadomya* cfr. *puschi* GOULDFUSS, Ditto.

Lithothamnium sp. Ditto.

Among the mentioned fossils, *Pecten* sp. was subsequently determined by KURODA (1931) as *Chlamys kaneharai* (YOKOYAMA).

The species discriminated by the writer are as follows:—

		Localities in Text-fig. 1.						
		x 1	x 2	x 3	x 4	x 5	x 6	x 7
1.	*Chlamys kaneharai* (YOKOYAMA).....abundant	x	x	x	x	x	x	x
2.	*Chlamys kannogawaensis* SHIBATA, n. sp....rare					x		
3.	*Lima* (*Lima*) cfr. *konnoi* OTUKA ..... 〃					x		
4.	*Venericardia* sp. indet. ..... 〃					x		
5.	*Haliotis* sp. indet. .....abundant			x		x		
6.	Spines of Echinoidea ..... 〃		x					
7.	Smaller Foraminiferas ..... 〃		x					
8.	Calcareous algae ..... 〃		x					

Among the above mentioned fossils all except numbers 6–8 were collected from boulders.

Geological Horizon and Age

The geological horizon from which the fossils were collected is judged to be in the middle part of the undifferentiated Misaka series of MITSUCHI.

The geological age from the occurrence of *Chlamys kaneharai* (YOKOYAMA) and *Lima* cfr. *konnoi* OTUKA is assumed to be not older than lower Miocene.

Systematic Description

Genus *Chlamys* RÖDING, 1798

Chlamys kaneharai (YOKOYAMA)

Pl. 32, figs. 5a, 5b.

1926. *Pecten kaneharai* YOKOYAMA, *Jour. Fac. Sci. Imp. Univ. Tokyo, Sec. II, vol. 1, Art. 4*, pp. 135-136, pl. VIII, fig. 1, pl. XIX, figs. 1, 2, 5-7.

1936. *Pecten kaneharai* NOMURA and HATAI, *Saito Ho-on Kai Mus., Res. Bull., No. 10*, p. 119, pl. 13, figs. 3, 4.

1937. *Pecten* (*Chlamys*) *kaneharai* NOMURA and HATAI, *Ibid., No. 13*, p. 127. pl. 18, figs. 1, 2.

Shell large, right valve more inflated than the left, with 18 radial ribs, interstices deep and more or less broader than the ribs, ribs high elevated, round, divided into three parts by two longitudinal furrows, central part broader than the sides and elevated; three radial riblets in interstices, central one broadest, the others weak or sometimes obsolete. Radial ribs and riblets more or less scaly. Posterior ear triangular, truncated behind; surface sculptured by

Dimensions:—

	Height	Length	Depth	Number of rib
Reg. No. 7661*	90.5 mm	—	14 mm	17
Reg. No. 7662*	95.2	—	12	18
Reg. No. 7663*	111.5	—	18	—

several radial ribs and concentric growth lines, especially remarkable on the posterior margin.

Remarks:—Many fragmental specimens were obtained. According to T. NAGAO, the differences between *C. kaneharai* and *C. ashiyaensis* are the inflation of both valves. That is, in the former the right valve is inflated, while in the latter the left valve is inflated. Moreover, the sculpture of the right valve of the former and the left valve of the latter is nearly the same. Comparing with *C. ashiyaensis*, however, the radial ribs of the right valve of *C. kaneharai* are remarkably elevated and the interstices are deep and somewhat broader than the ribs.

Locality:—Idozawa, Aone-mura, Tsukui-gun, Kanagawa Prefecture; Kaizawa, Dōshi-mura, Minamitsuru-gun, Yamanashi Prefecture.

Chlamys kannogawaensis SHIBATA, n. sp.

Pl. 32, figs. 4a, 4b.

Shell small, oval in outline, higher than long, inequilateral, test thin, moderately convex, umbonal angle 78 degrees.

Right valve:—Antero-dorsal margin long and straight, postero-dorsal margin short and straight; antero-ventral margin narrowly round, postero-ventral margin broadly rounded; surface sculptured by many radial ribs and grooves alternatively: ribs 24 in number, broader than intercalaries, elevated and its top somewhat roundly flattened; the surface of the ribs are smooth, not divided; the bottom of the intercalaries are flat, sometimes one weak radial riblet present.

Ears unequal, anterior longer than the posterior, one and a quarter times of the posterior in length. Hinge length about 2/3 times of the shell length. Byssal notch narrow and deep. Ctenolium present. On the surface of the ears respectively 5 radial ribs present. Posterior ear triangular, truncated rectangularly behind.

Dimensions:—Reg. No. 7664, Monotypic. Height 37.5 mm, length 28.5 mm, hinge length 19 mm, depth 15.2 mm, length/height 0.76

Comparisons and affinities:—This species is allied to *Pecten kakisakiensis* NOMURA and NIINO and *Chlamys nobilis* (REEVE), but the present specimen differs from the former by the following points, that is, 1) being higher than long, 2) narrow umbonal angle, 3) having 24 ribs, 4) surface of the ribs smooth, 5) ribs not divided, 6) radial riblets on both ears, 7) hinge length reaches to 2/3 times of disc length; and this species is discriminated from the latter by the following points, that is, 1) inequilateral, 2) narrow umbonal angle, 3) ribs broader than interstices, 4) sometimes one weak radial riblet present in interstices, 5) ribs surface smooth and simple, 6) ribs are rounded.

Remarks:—The specimens are represented only by exterior mould and cast of the right valve.

Locality:—Idozawa, Aone-mura, Tsu-

* All of the specimens are preserved in the collection of the Institute of Geology and Mineralogy, Tokyo University of Education.

kui-gun, Kanagawa Prefecture.

Genus *Lima* BRUGUIÈRE, 1797

Lima (*Lima*) cfr. *konnoi* OTUKA

Pl. 32, fig. 3.

1938. *Lima konnoi* OTUKA, *Jour. Fac. Sci. Imp. Univ. Tokyo, Sec. II, pt. 5, No. 1*, p. 11, pl. 1, fig. 8.
1943. *Lima* (*Lima*) *konnoi* TAKI, OTUKA and SUZUKI, *Conch. Asiatica vol. 1*, p. 58, pl. XII, fig. 3, pl. XIV, fig. 15.

Shell medium in size, elongated oval in outline, inequilateral, inflated, anterior dorsal margin long, almost straight, antero-ventral margin narrowly rounded; postero-dorsal margin very short, postero-ventral margin broadly rounded; anterior ear indistinct, posterior ear remarkable, larger than the anterior; disc elevated rectangularly at the antero-dorsal extremity, then elevated gently, being highest at the central portion, then gradually decends towards the posterior dorsal margin; exterior surface with about 35 narrow, smooth, rounded radial ribs separated by flat interspaces; concentric growth lines remarkable at the antero-ventral submargin.

Dimension:—Reg. No. 7665. Height 60 mm, length 40 mm, depth 16 mm.

Comparisons and affinities:—The present specimen is closely allied to *Lima* (s. s.) *konnoi* OTUKA in its outline and the convexity, but it differs from *L. konnoi* by its larger size.

Remarks:—This specimen is represented by only one left valve and lacks the umbonal area, but the base of the posterior ear is visible.

Locality:—Idozawa, Aone-mura, Tsukui-gun, Kanagawa Prefecture.

Genus *Venericardia* LAMARCK, 1801

Venericardia sp. indet.

A cast sculptured with external surface.

Locality:—Idozawa, Aone-mura, Tsukui-gun, Kanagawa Prefecture.

Genus *Haliotis* LINNAEUS, 1758

Haliotis sp. indet.

Pl. 33, figs. 1, 2.

Two comparatively well preserved and many fragmental specimens were obtained. All are external casts.

The surface of these specimens are sculptured by multiple radial and concentric lines. The curvature of the concentric lines of the umbonal area are strongly rolled.

Locality:—Halfway up the east side of Kanetsuki-yama, Aone-mura, Tsukui-gun, Kanagawa Prefecture. Reg. Nos. 7666, 7667.

Literature cited

GRANT, H. S., and GALE, R. (1931), Pliocene and Pleistocene Mollusca of California, *Mem. San Diego Soc. Nat. Hist., vol. 1.*

HABE, T. (1951), Genera of Japanese Shells, Pelecypoda, No. 1. (in Japanese)

MITSUCHI, T. (1932), Hachioji, Explanatory Text of the Geological Map of Japan (Scale 1: 75,000) *zone 24 col. VI. sheet 113*, Imp. Geol. Surv. Japan.

NAGAO, T. (1928), Palaeogene Fossils of the Island of Kyushu, Japan. Pt. II, *Sci. Rep. Tohoku Imp. Univ, 2nd Ser., vol. XII, No. 1.*

NOMURA, S. and NIINO, H. (1932), Fossil Mollusca from Izu and Hakone. *Ibid., vol. XV. No. 3.*

NOMURA, S. and HATAI, K. (1936), Fossils from the Tanagura Beds in the Vicinity of the Town Tanagura, Hukushima-ken, Northeast Honsyu, Japan. *Saito Ho-on Kai Mus. Res. Bull., No. 10*, p. 119, pl. 13, figs. 3, 4.

—— & —— (1937), List of the Miocene Mol-

lusca and Brachiopoda Collected from the Region lying North of the Nanakita River in the Vicinity of Sendai, Rikuzen Province, Japan. *Ibid., No. 13*, p. 127, pl. 18, figs. 1, 2.

NOMURA, S. (1940), Molluscan Fauna of the Moniwa Shell Bed exposed along the Natori-gawa. *Sci. Rep. Tohoku Imp. Univ., 2nd Ser., vol. XXI, No. 1*, p. 18.

OTUKA, Y. (1938a), Neogene Fossils of the Ihara District, Sizuoka Prefecture, Japan. *Jour. Fac. Sci. Imp. Univ. Tokyo, Sec. II, vol. 5, Pt. 1.*

—— (1938b), A Fossil from the middle formation of Misaka series. (in Japanese), *Jour. Geol. Soc. Japan, vol. 45, No. 536*, p. 424.

REEVE, L.A. (1855), *Conch. Icon., vol. VIII, Pecten No. 64*, pl. XVIII, figs. 64a, b.

SOWERBY, G.B. (1847), *Thes. Conch., 1*, p. 75, No. 92, pl. XV, fig. 111, pl. XVII.

TAKI, I, OTUKA, Y. and SUZUKI, K. (1943), *Conch. Asiatica vol. 1.* (in Japanese)

YABE, H. (1920), Tertiary rocks with Higher Foraminifera from Japan. (in Japanese) *Jour. Ceol. Soc. Japan, vol. 27*, p. 377.

YOKOYAMA, M. (1920), Fossils from the Miura Peninsula and its Immediate North. *Jour. Coll. Sci. Imp. Univ. Tokyo, vol. 39, Pt. 6*, p. 148, pl. XII, fig. 8.

—— (1926), Tertiary Mollusca from Shiobara in Shimotsuke. *Jour. Fac. Sci. Imp. Univ. Tokyo, Sec. II, vol. 1, Pt. 4*, pp. 135–136, pl. VIII, fig. 1, pl. XIX, figs. 1, 2, 5–7.

—— (1927), On the Occurrence of Lower Tertiary Formation in the Province of Hoki. *Jour. Geol. Soc. Japan, vol. 34*, p. 13, pl. 8.

Explanation of Plate 33

(All figures in natural size unless otherwise stated)

Fig. 1. *Haliotis* sp. External cast.
From Idozawa, Aone-mura, Tsukui-gun, Kanagawa Prefecture. Reg. No. 7666 (Inst. of Geol. & Min., Tokyo Univ. of Education)

Fig. 2. Ditto.
Reg. No. 7667 (Inst. of Geol. & Min., Tokyo Univ. of Education)

Fig. 3. *Lima* (*Lima*) cfr. *konnoi* OTSUKA. Left valve.
From Idozawa, Aone-mura, Tsukui-gun, Kanagawa Prefecture. Reg. No. 7665 (Inst. of Geol. & Min., Tokyo Univ. of Education)

Fig. 4a. *Chlamys kannogawaensis* SHIBATA, n. sp. Internal mould of right valve.
From Idozawa, Aone-mura, Tsukui-gun, Kanagawa Prefecture. Reg. No. 7664 (Inst. of Geol. & Min., Tokyo Univ. of Education)

Fig. 4b. Ditto.
External cast of right valve.

Fig. 5a. *Chlamys kaneharai* (YOKOYAMA). Internal mould of left valve. × 0.74
From Kaizawa, Doshi-mura, Minamitsuru-gun, Yamanashi Prefecture. Reg. No. 7661 (Inst. of Geol. & Min., Tokyo Univ. of Education)

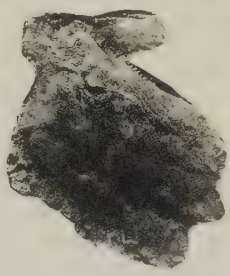
Fig. 5b. Ditto.
External cast.

1

3

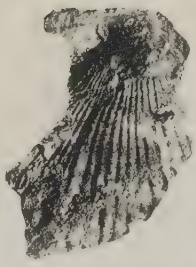
5a

4a

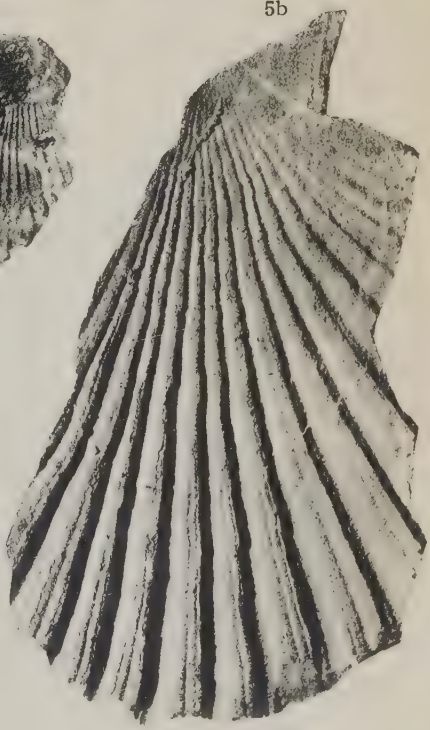


2

4b



5b



Trans. Proc. Palaeont. Soc. Japan. N. S., No. 23, pp. 235—242, Pl. 34, 1 text-fig., Aug. 31, 1956

296. NEOSCHWAGERININAE FROM THE SHIMA PENINSULA, JAPAN*

NOBUO YAMAGIWA

Osaka University of Liberal Arts and Education

志摩より産する Neoschwagerininae について：筆者は志摩産 Neoschwagerininae を研究中，新たに *Cancellina* 属中 1 種，*Neoschwagerina* 属中 2 種の 3 新種を発見したので，ここに記載報告する。 山 際 延 夫

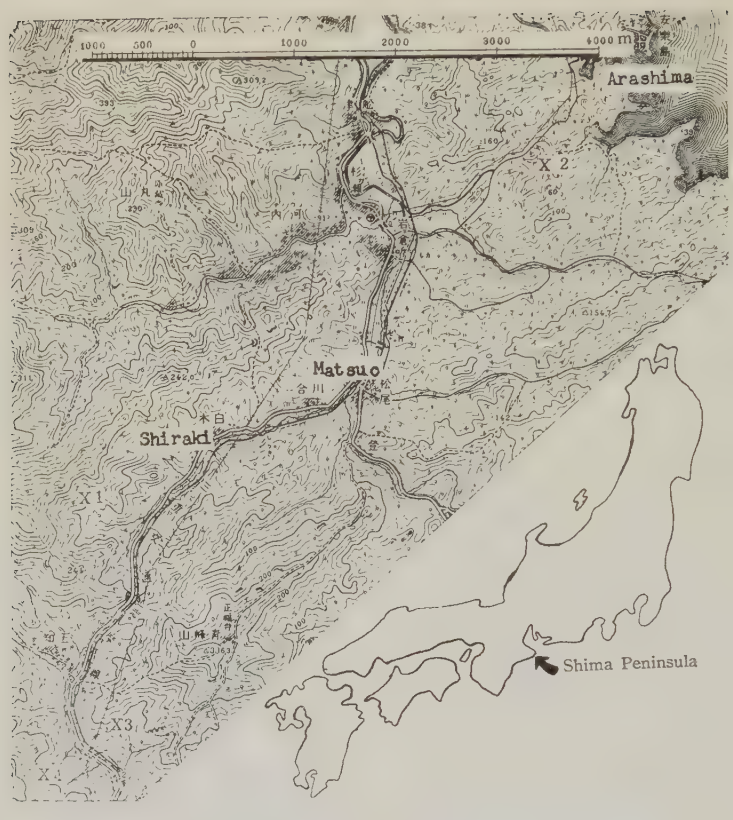
Neoschwagerininae from the Shima Peninsula was already reported by FUJIMOTO and MATSUSHITA. Namely, *Neoschwagerina* cf. *craticurifera* (S.) and others were discovered by FUJIMOTO (1942) at the Kusakidani limestone, Isobe-cho, and *Neoschwagerina* cf. *craticurifera* (S.) and *Neoschwagerina* sp. were discovered by MATSUSHITA (1953) at the Kageyama and Koshikiiwa limestones, Isobe-cho.

Since 1951, I have been studying the geology of the Shima Peninsula and meanwhile have discovered newly Neoschwagerininae from the Futaji limestone, Arashima-cho, Toba-city and the Urayama limestone, Shiraki-cho, Toba-city. The formation containing the Urayama limestone consists in the north side of Arashima-Gokasho tectonic line and is composed of sandstone, shale, chert, schalstein and limestone. This formation has hitherto been regarded as the equivalent to *Pseudofusulina* zone, but as the result of the present study, I have furthermore discovered *Neoschwagerina* sp. from the Urayama limestone. It is suggested, therefore, that not only *Pseudofusulina* zone, but also *Neoschwagerina* zone is developed in this district.

The formation containing the Futaji limestone consists in the south side of A.-G. tectonic line and is composed of sandstone, shale, chert, schalstein, limestone and conglomerate. The formation is in fault contact with the mesozoic formations of the north and south sides. As the result of the present study, I have discovered *Yabeina* cf. *katoi* (O.) and Schwagerininae gn. sp. indet. from the Futaji limestone. It is suggested, therefore, that *Yabeina* zone is developed in this district.

The formation containing the limestones of the Kusakidani and Kageyama consists in the south of the formation containing the Futaji limestone and is in fault contact with the mesozoic formations of the north and south. This formation consists of sandstone, shale, chert, schalstein and limestone. I have discovered *Neoschwagerina fujimotoi* YAMAGIWA n. sp., *N. sakaguchii* Y. n. sp., *N.* sp., *Cancellina matsushitai* Y. n. sp., *C.*? sp., *Schubertella* sp. and Foraminifera gn. sp. indet. from the Kusakidani limestone and *N. fujimotoi* Y. n. sp., *N.* sp., *C. matsushitai* Y. n. sp., *Pseudodoliolina* sp., *Schubertella* sp. and Foraminifera gn. sp. indet. from the

* Read Oct. 29, 1955; received, Dec. 9, 1955



Locality Map.

Loc. 1 Urayama, Loc. 2 Futaji, Loc. 3 Kusakidani, Loc. 4 Kageyama

Kageyama limestone. It is suggested that *Neoschwagerina* zone is developed in this district.

The said formations strike N 50°–70°E and dip 50°–70°N.

I wish to express my cordial thanks to Prof. H. FUJIMOTO of Tokyo University of Education for his kind advices and for his kindness of reading the manuscript of this paper. I also wish to express my hearty thanks to Prof. S. MATSUSHITA of Kyoto University, who permitted me free use of the library of his Department, to Assist. Prof. S. SAKAGUCHI of Osaka University of Liberal Arts and Education, Assist. Prof. R. MORIKAWA of Saitama University, Lecturer K. NAKAZAWA of Kyoto University, Mr. ISHII of Osaka City University, Mr. Y. KUSAKABE and Mr. T. SHIKI of Kyoto University and Mr. M. KOBAYASHI of Tokyo University of Education for their discussions of the species included in this paper.

Subfamily Neoschwagerininae DUNBAR & CONDRA, 1928

Genus *Cancellina* HAYDEN, 1909

Cancellina matsushitai YAMAGIWA n. sp.

Plate 34, Figs. 1–4

Description:—The shell is small and

elliptical with straight axis of coiling, somewhat rounded poles. The mature specimens are generally 6 to 7 volutions. The specimen of holotype is 1.24 mm long and 0.94 mm wide, giving form ratio of 1.3. The coiling shows gradual increasing from the first volution. The first 2 volutions have short axis of coilling, and the first volution is evolute. The 3rd to last volutions have long axis of coiling. The proloculus is rather small and subspherical, and the outside diameter is 0.06 mm to 0.10 mm. The spirotheca is composed of a tectum and keriotheca, and the thickness of the last volution is 0.04 mm to 0.06 mm. The septa are straight, and the counts of the 3rd to 6th of a typical specimen are 11 (?), 13, 16 and 20. The transverse septula are present, but the axial septula and secondary transverse septula are absent.

Comparison:—*Cancellina matsushitai* is elliptical in shape, but the species is thicker spirotheca and smaller shell than *C. nipponica*. The proloculus of *Cancellina matsushitai* is smaller than holotype of *C. primigena*. It is similar to *Cancellina tosayamensis*, but the latter is larger shell than the former. The present form is distinguished by smaller shell and shorter form ratio than *Cancellina kobayashii*. This species also can be distinguished from the said 4 species of *Cancellina* by the respect that the first volution of the former is evolute.

Occurrence:—This species was found in Kusakidani and Kageyama, Isobe-cho, associated with *Neoschwagerina fujimotoi*, *N. sakaguchii*, *Cancellina*? sp. and others.

Holotype:—I. A. G. G.* Osaka University of Liberal Arts and Education. No. 54001 (pl. 34, fig. 1).

Paratypes:—do. Nos. 54002, 54003, 54004.

Table 1. Measurements of *Cancellina matsushitai* YAMAGIWA n. sp. in millimeters.

Spec.	Fig.	L.	W.	R.	P.	Rate of growth 1	2	3	4	5	6	7
1	1	1.24	0.94	1.3	0.06	0.14	0.20	0.31	0.41	0.56	0.73	0.94
2	2	—	1.08	—	0.10	0.17	0.28	0.39	0.55	0.76	1.08	—
3	3	—	0.82	—	0.08	0.14	0.20	0.31	0.43	0.61	0.82	—
4	4	1.25	0.84	1.5	—	—	—	—	0.39	0.59	0.84	—

Spec.	Form ratio of volutions 1	2	3	4	5	6	7	Thickness of spirotheca 1	2	3	4	5	6	7
1	0.6	0.9	1.1	1.4	1.5	1.4	1.3	—	—	0.02	0.03	0.02	0.04	—
2	—	—	—	—	—	—	—	—	—	0.02	0.04	0.04	—	—
3	—	—	—	—	—	—	—	—	—	0.02	0.02	0.04	0.04	—
4	—	—	—	1.4	1.4	1.5	—	—	—	—	0.02	0.04	0.06	—

Genus *Neoschwagerina* YABE, 1903

Neoschwagerina sakaguchii
YAMAGIWA n. sp.

Plate 34, Figs. 5–10, 17

Description:—The shell is medium, somewhat elongate, elliptical fusiform and subspherical in the first 2 or 3 volutions, and beyond the 3rd or 4th volution the shell assumes mature

* Institute of Astronomy, Geophysics and Geology.

shape. My specimens have 9 to 12 (?) volutions. The specimens of 10 volutions are 3.67 mm to 4.53 mm long and 2.24 mm to 2.56 mm wide, giving form ratios of 1.7 to 1.8, respectively. The proloculus is small and subspherical, with the outside diameter of 0.03 mm. The spirotheca is rather thick, increasing gradually from the first one, and the thickness of the ultimate or penultimate is 0.06 mm to 0.10 mm. The spirotheca is composed of a tectum and keriotheca. The septa are straight, and the count is about 14 or 15 in 7th volution. The transverse septula occur throughout the shell. The axial spetula are present, and there are one septulum between the adjacent septa in the 5th to last volutions. The secondary transverse septula are absent.

Comparison:—*Neoschwagerina craticurifera* and *N. fujimotoi* are more inflated than this species. The latter is elongate form than the former. This species resembles *Cancellina nipponica*, but the former has thicker spirotheca, smaller proloculus and larger shell than the latter. This species also is distinguished from the said species of *Cancellina* in the respect that the axial septula of the former appear in more early volution than the latter.

Occurrence:—This is from Kusakidani, Isobe-cho, associated with *Neoschwagerina fujimotoi*, *Cancellina matsushitai* and others.

Holotype:—I. A. G. G., Osaka University of Liberal Arts and Education. No. 54005 (Pl. 34, fig. 8).

Paratypes:—do. Nos. 54006, 54007, 54008, 54009, 54010, 54011.

Table 2. Measurements of *Neoschwagerina sakaguchii* YAMAGIWA n. sp. in millimeters.

Spec.	Fig.	L.	W.	R.	P.
1	8	4.53	2.45	1.8	0.03
2	7	4.39	2.57	1.7	—
3	5	3.75	2.24	1.7	?
4	10	—	2.39	—	—
5	6	—	1.86	—	0.06

Rate of growth

Spec.	1	2	3	4	5	6	7	8	9	10	11	12
1	0.12	0.20	0.28	0.41	0.61	0.86	1.16	1.55	1.94	2.45	2.68*	—
2	—	0.16	0.27	0.43	0.63	0.90	1.20	1.61	2.06	2.57	—	—
3	0.08	0.17	0.27	0.37	0.51	0.69	0.94	1.27	1.70	2.24	2.82	3.35
4	—	—	0.25	0.37	0.55	0.82	1.14	1.57	2.04	2.39	—	—
5	0.10	0.18	0.29	0.43	0.65	0.88	1.16	1.49	1.86	—	—	—

Thickness of spirotheca

Spec.	1	2	3	4	5	6	7	8	9	10	11	12
1	—	0.01	0.04	0.02	0.04	0.05	0.05	0.08	0.08	0.08	0.06*	—
2	—	—	0,02	0.04	0.06	0.06	0.07	0.07	0.10	0.09	—	—
3	—	—	0.02	0.02	0.03	0.03	0.04	0.08	0.08	0.08	0.07	0.06
4	—	—	0.02	0.02	0.04	0.04	0.06	0.08	0.09	0.09	—	—
5	—	—	0.02	0.03	0.04	0.05	0.04	0.06	0.06	—	—	—

* 10.5 volutions.

Spec.	Form ratio of volutions											
	1	2	3	4	5	6	7	8	9	10	11	12
1	1.0	1.0	1.5	1.8	1.7	2.0	2.0	2.0	2.0	1.8	—	—
2	—	1.1	1.2	1.4	1.5	1.8	1.9	1.9	1.8	1.7	—	—
3	1.1	1.2	1.4	1.7	1.8	1.9	2.0	1.9	1.9	1.7	—	—
4	—	—	—	—	—	—	—	—	—	—	—	—
5	—	—	—	—	—	—	—	—	—	—	—	—

Neoschwagerina fujimotoi
YAMAGIWA, n. sp.

Plate 34, Figs. 11-15

Description:—The shell is medium and elliptical, inflated fusiform, with straight axis of coiling. The first 2 or 3 volutions are subspherical in shape, and beyond the 4th or 5th volution the shell assumes mature shape. The mature specimens have 12 or 13 volutions. My specimens of 12 volutions are 4.73 mm to 5.53 mm long and 3.25 mm to 3.65 mm wide. The form ratios are 1.5, respectively. The coiling is tight in the first 3 or 4 volutions and gradually becomes loose toward the outer ones. The proloculus is small and spherical, with the outside diamter of 0.04 mm to 0.06 mm. The spirotheca consists of a tectum and keriotheca, and in the first 3 or 4 volutions it is thin, but thick in the outer ones. The keriotheca can be seen in the outer ones. The septa are straight and the counts of the 2nd to 8th volutions of a typical specimen are 5, 9, 11, 12, 13, 14 and 16, respectively. They are composed of a tectum and anterior and posterior downward extensions of the keriotheca of the spirotheca. The transverse septula occur throughout the shell. The axial septula are present, and there are one septulum between the adjacent septula in the 4th or 5th to last volutions. The secondary transverse septula are absent.

Comparison:—It resembles *Neoschwagerina brevis*, but the first 2 to 3 volutions of the latter are slightly evolute, and the outer volutions of the latter occur 2 axial septula between the adjacent septa. *Neoschwagerina craticurifera* var. *haydeni* is similar to this species, but the count of the septa of the latter is more few than the former. The coiling of the outer volutions of *Neoschwagerina fujimotoi* is looser than *N. craticurifera* var. *haydeni*. This species is more elliptical than *N. margaritae*.

Occurrence:—This species was found in Kusakidani and Kageyama, Isobecho, associated with *Neoschwagerina sakaguchii*, *Cancellina matsushitai*, *C.*? sp., *Pseudodoliolina* sp. and others.

Holotype:—I.A.G.G. Osaka University of Liberal Arts and Education. No. 54012 (Pl. 34, fig. 14).

Paratypes:—do. 54013, 54014, 54015, 54016.

Table 3. Measurements of *Neoschwagerina fujimotoi* YAMAGIWA n. sp. in millimeters.

Spec.	Fig.	L.	W.	R.	P.
1	15	4.73	3.25	1.5	0.06
2	14	4.85	3.36	1.5	0.04
3	13	5.53	3.65	1.5	—
4	11	—	3.92	—	—
5	12	—	3.44	—	0.04

Rate of growth

Spec.	1	2	3	4	5	6	7	8	9	10	11	12	13
1	0.14	0.20	0.29	0.41	0.57	0.86	1.14	1.48	1.82	2.28	2.74	3.25	3.51*
2	0.10	0.18	0.29	0.41	0.57	0.80	1.06	1.43	1.82	2.34	2.85	3.36	—
3	—	—	—	0.34	0.60	0.86	1.14	1.54	2.02	2.57	3.08	3.65	—
4	0.10	0.20	0.31	0.45	0.63	0.82	1.10	1.43	1.63	2.29	2.90	3.47	3.92
5	0.10	0.22	0.33	0.41	0.57	0.86	1.19	1.59	2.00	2.49	2.94	3.44	—

Thickness of spirotheca

Spec.	1	2	3	4	5	6	7	8	9	10	11	12	13
1	—	—	—	0.02	0.03	0.05	0.05	0.06	0.09	0.08	0.06	0.06	0.06*
2	—	—	—	0.02	0.04	0.04	0.06	0.06	0.08	0.10	0.12	0.06	—
3	—	—	—	0.04	0.06	0.06	0.06	0.09	0.08	0.09	0.06	0.10	—
4	—	0.02	0.02	0.03	0.03	0.04	0.05	0.06	0.08	0.09	0.10	0.08	0.08
5	0.02	0.02	0.02	0.02	0.03	0.05	0.08	0.06	0.06	0.07	0.08	0.06	—

Form ratio of volutions

Spec.	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1.0	1.2	1.4	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	—
2	1.0	1.1	1.1	1.3	1.3	1.3	1.4	1.5	1.6	1.5	1.4	1.5	—
3	—	—	—	1.3	1.4	1.5	1.5	1.4	1.4	1.4	1.4	1.5	—
4	—	—	—	—	—	—	—	—	—	—	—	—	—
5	—	—	—	—	—	—	—	—	—	—	—	—	—

Genus *Yabeina* DEPRAT, 1914

Yabeina cf. *katoi* (OZAWA), 1917

Plate 34, Fig. 16

1927. *Neoschwagerina katoi* OZAWA. Stratigraphical studies of the Limestone of Akasaka, Prov. of Mino, *Jour. Fac. Sci. Imp. Univ. Tokyo, vol. II. part. 3*, p. 159, pl. XLI, figs, 1, 10, pl. XLIII, figs. 1a, 2a, 3, 5, 6.

1936. *Neoschwagerina katoi* FUJIMOTO, Stratigraphical and palaeontological studies of the Titibu System, *Sci. Rep. Tokyo Bunrika D., sec. c. no. 2*, p. 118, 119, pl. XXIV, figs. 5–8.

Description:—The shell is large and spherical, with straight axis of coiling. My specimen has 17.5 volutions. The specimen of 17 volutions is 5.36 mm long and 4.45 mm wide, giving form ratio of about 1.2. The widths of the first to 17th volutions are 0.16, 0.29, 0.41, 0.53, 0.69, 0.90, 1.06, 1.31, 1.55, 1.88, 2.18, 2.51, 2.85, 3.19, 3.59, 3.99 and 4.45 mm. The width of the 17.5 volutions is 4.67 mm. The form ratios are 1.3 for the first volution, 1.4 for the 2nd volution, 1.5 for the 3rd to 8th volutions, 1.3 for the 9th to 13th volutions and 1.2 for the 14th to 17th volutions. The spirotheca and septa are thin, and the former consists of a tectum and keriotheca. The thickness of the spirotheca is about 0.02 mm in the thickest ones. The transverse septula occur throughout the shell. The secondary transverse septula first appear in 10th (?) volution, and there are one septulum between the adjacent transverse septula in the 10th (?) to last volutions. I am sorry I have no cross section. Therefore, the septa and axial septula can not be seen.

* 12.5 volutions.

Comparison:—Formerly, this species was reported by OZAWA (1927) and FUJIMOTO (1936). The present form closely agrees with OZAWA's original illustration, but smaller than the latter. Also it resembles FUJIMOTO's specimens, but the coiling of my specimen is somewhat tighter than his specimens. OZAWA's and FUJIMOTO's specimens and my specimen have thin spirotheca and septa, secondary transverse septula. Therefore, this species is referred to *Yabeina*.

Occurrence:—This species was found in Futaji, Arashima-cho, Toba-city, associated with Schwagerininae gn. sp. indet.

I.A.G.G. of Osaka University of Liberal Arts and Education. No. 54017.

References

COLANI M. (1924), Nouvelle contribution à l'étude des Fusulinidés de l'Extrême Orient: *Indochine Service Géol., Mém., vol. 11, fasc. 1.* (After Catalogue of Foraminifera by ELLIS and MESSINA)

DEPRAT, J. (1912), Étude des Fusulinidés de Chine et d' Indochine et classification des calcaires à Fusulines: *Indochine Service Géol., Mém., vol. 1, fasc. 3* (After Catalogue of Foraminifera by ELLIS and MESSINA)

—— (1913), Les Fusulinidés des calcaires carboniériens et permiens du Tonkin, du Laos et du Nord-Annam: *Indochine Service Géol., Mém., vol. 2, fasc. 1.* (After Catalogue of Foraminifera by ELLIS and MESSINA)

—— (1914), Étude comparative des Fusulinidés d'Akasaka (Japon) et des Fusulinidês de Chine et d' Indochine: *Indochine Service Géol., Mém., vol. 3, fasc.* 1. (After Catalogue of Foraminifera by ELLIS and MESSINA)

DOUTKEVITCH, C. A., & KHABAKOV, A.B. (1934), Permian fauna of Fusulinidae found in the sections of Kara-su and Kuberganda in East Pamir: *Acad. Sci. U.S.S.R., Tadjik Complex Exped. 1932, Geol. Pamir, vol. 8* (After Catalogue of Foraminifera by ELLIS and MESSINA)

FUJIMOTO, H. (1936), Stratigraphical and palaeontological studies of the Titibu system of the Kwanto-Mountainland. Part. 2. Palaeontology: *Tokyo Bunrika Daigaku, Geol. Inst., sec. c, no. 2, vol. 1.*

—— (1942), Geology of the Toba Area, Mie Prefecture (Abstract) (in Japanese): *Jour. Geol. Soc. Japan. vol. XLIX, no. 585.*

HAYDEN, H. H. (1909), Fusulinidae from Afghanistan: *India Geol. Servey, Records, vol. 38* (After Catalogue of Foraminifera by ELLIS and MESSINA)

IIZUKA Y. (1928), Explanatory text of geol. map of Japan, Toba sheet, Scale 1:75000 (written in Japanese with English resume): *Geol. Surv. Japan.*

LANGE, E. (1925), Eine mittelpermische Fauna von Guguk Bulat (Padanger Oberland, Sumatra): *Geol. -mijnb. genootsch. Nederland and Kolonien, Verh., Geol. ser., Deel 7* (After Catalogue of Foraminifera by ELLIS and MESSINA)

MATSUSHITA, S. (1953), Kinki District, Regional geology of Japan (in Japanese): Asakura Book Co.

OZAWA, Y. (1922), Preliminary notes on the classification of the Family Fusulinidae (in Japanese): *Geol. Soc. Tokyo, Jour., vol XXIX.*

—— (1925a), On the classification of Fusulinidae: *Tokyo Imp. Univ., Coll. Sci., Jour., vol. 45, art. 4.*

—— (1925b), Palenotological and stratigraphical studies on the Permo-Carboniferous limestone of Nagato. Part II. Palaeontology: *Tokyo Imp. Univ., Coll. Sci., Jour., vol. 45, art 6.*

—— (1927), Stratigraphical studies of the *Fusulina* limestone of Akasaka, Province of Mino: *Tokyo Imp. Univ., Fac. Sci., Jour., sec. 2, vol. 2, pt. 3.*

SCHWAGER, C. (1883), Carbonische Foraminiferen aus China und Japan: *von Richthofen's China, vol. 4* (After Catalogue of Foraminifera by ELLIS and MESSINA)

THOMPSON, M. L. (1948), Studies of American

Fusulinids: *Univ. Kansas, Paleont. Contr. Protozoa, Art. 1.*

——, WHEELER, H. E., and DANNER, W. R. (1950), Middle and Upper Permian fusulinids of Washington and British Columbia. *Cushman Found. Foram. Res., Contrib., Washington, D. C.,vol. 1, pts. 3-4* (After Catalogue of Foraminifera by ELLIS and MESSINA)

TORIYAMA, R. (1947), On some Fusulinids from Tosayama, Koti-ken, Sikoku, with a note on the stratigraphical range of *Neoschwagerina.*: *Japanese Jour. Geol. Geogr., vol. 20, nos. 2-4.*

YAMAGIWA, N. (1955), Messzoic and palaeozoic formations from the Shima Peninsula, Japan (Abstract) (in Japanese): *Jour. Geol. Soc. Japan. vol. LXI, no. 718.*

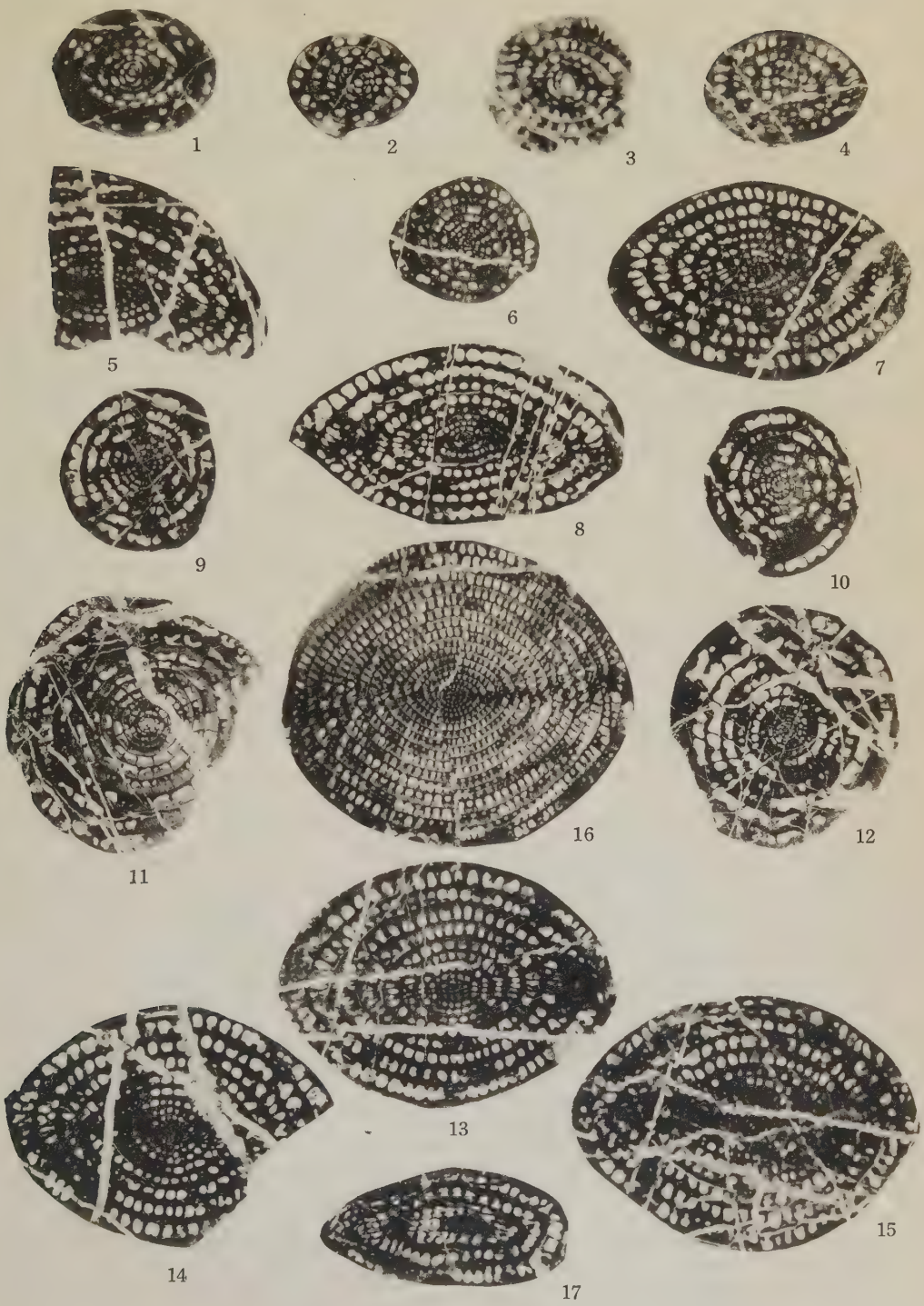
Explanation of Plate 34

Figs. 1-4, *Cancellina matsushitai* YAMAGIWA n. sp.: 1 Axial section (× 20). 2, 3. Cross section (× 20). 4. Tangential section (× 20).
Localities: 1, 2, 4, Kusakidani, Isobe-cho. 3, Kageyama, Isobe-cho.

Figs. 5-10, 17. *Noschwagerina sakaguchii* YAMAGIWA n. sp. 5, 8, Axial sections (× 10). 6. Cross section (× 10). 7, 17. Tangential sections (× 10). 9, 10, Parallel sections (× 10). Locality: 5-10, 17. Kusakidani, Isobe-cho.

Figs. 11-15. *Neoschwagerina fujimotoi* YAMAGIWA n. sp. 11, 12. Cross sections (× 10). 13 Tangential section (× 10). 14, 15. Axial sections (× 10).
Locality 11-15. Kusakidani, Isobe-cho.

Fig. 16. *Yabeina* cf. *katoi* (OZAWA). 16. Axial section (× 10). Locality: Futaji, Arashima, Toba-city.



S. AOKI Photo

Trans. Proc. Palaeont. Soc. Japan, N.S., No. 23, pp. 243—245, 1text-fig., Aug. 31, 1956

297. AN INTERESTING NEW FORM OF THE ATURIDAE FROM THE PALAEOGENE OF NORTHERN KYUSHU*

TEIICHI KOBAYASHI

Geological Insitute, University of Tokyo

北九州古第三系産 Aturidae の興味ある新型：福岡県嘉穂郡碓井町麻生吉隈炭鉱で直方層郡大焼層から産出した本化石は (1) 螺旋の断面が幅広い亜三角形で (2) 体管は背縁に位し (3) 縫合線の側鞍は大で，内側の主弧と外側の小副弧に分れている．そして (4) 主弧間に低い稜がある．これらの特徴から見てこれは Aturidae の新属と考えられるが，標本が不完全なので新種 "*Aturia*" *matsushitai* を樹てるにとどめる．

小 林 貞 一

Patches of Tertiary sediments are scattered on the northwest and south east sides of Kyushu island (3,6660 km) and adjoining isles, but pre-Tertiary formations and igneous rocks are much more extensive, occupying roughly nine-tenths of the area or more. The Tertiary terrain is not large, but may be said most prolific of fossil nautiloids in Japan or in Eastern Asia, in view of the known occurrences of *Aturia yokoyamai* and other species including two new genera (Yokoyama, 1911, Nagao, 1626 ane Shimizu, 1926). One of the two is *Neocymatoceras tsukushiense* and the other *Obinautilus pulchra* (Kobayashi, 1955a, b). The third is probably a new genus of the Aturidae, but I hesitate to erect a genus out of the specimen in hand, because its preservation is unfortunately insufficient for the genoholotype. Therefore it is simply called "*Aturia*" *matsushitai*. This specific name is proposed in honour of Prof. Hisamichi Matsushita of the Kyushu University who made valuable contributions to the Palaeogene stratigraphy of Kyushu. I am obliged to him for studying this interesting nautiloid which he collected and belongs to the collection of his geological Institute.

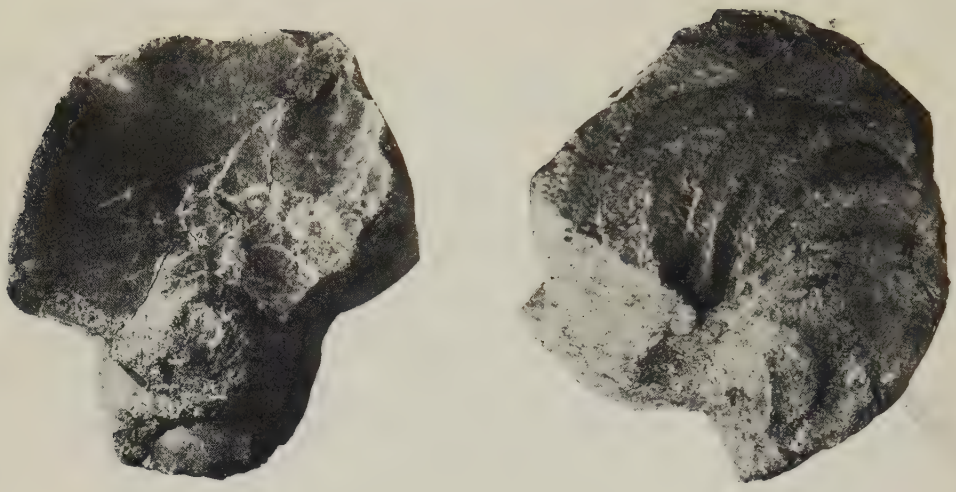
* Read at the annual meeting of this society at Sendai, Jan. 21, 1956; received Nov. 26 1955.

"*Aturia*" *matsushitai* Kobayashi, new species

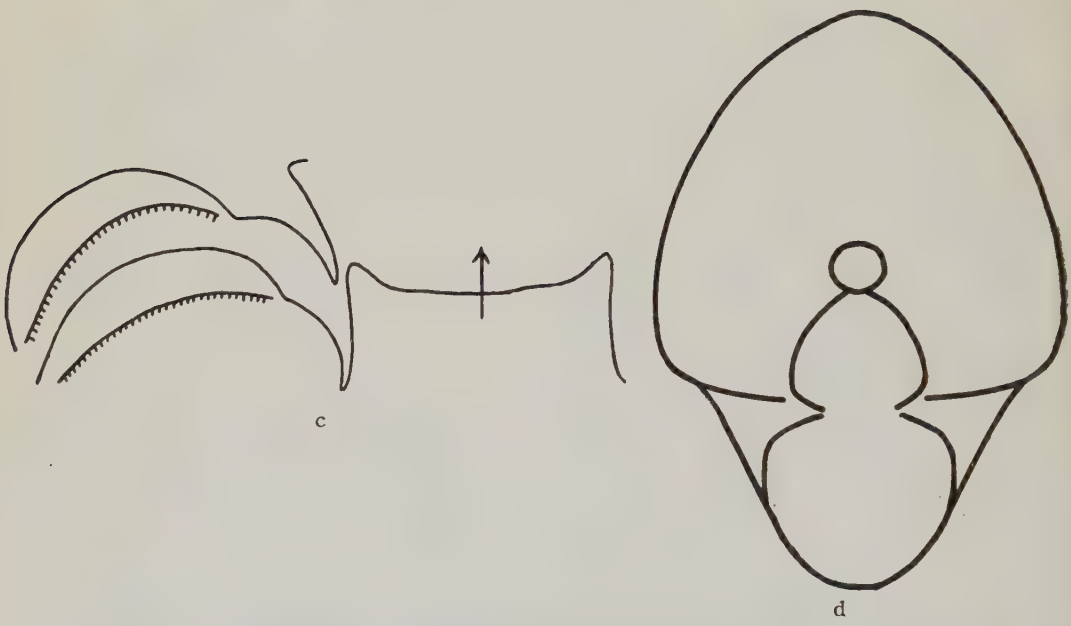
Text-figures a-d.

Description:—Shell globular rather than discoidal, very broad and nautiliconic; umbilicus very narrow and deep, if not completely closed. The ventral part of the last whorl is unpreserved, but the cross section of the whorl is presumably subtriangularly ovate and a little broader than high, being about 55 mm and 47 mm. respectively in width and median height. The radius of the whorl may be 50 mm. or so. The siphuncle measuring 8 mm. in diameter in this section is located marginally on the dorsal side. Flanks are very gently convex.

Some 7 septa are distributed in a half



a b



c d

Figures a-b. Two views of "*Aturia*" *matsushitai* KOBAYASHI, new species. Natural size.
Figure c. Diagrammatic whorl section of *A. matsushitai*.
Figure d. Septal suture (line) and interseptal ridge (comb) of *A. matsushitai*.

of the last whorl. There is a large lateral saddle on the flank which consists of the main arc and a small outer one. An obtuse median ridge extends from the junction of the latter arc with the former and runs through the space between the sutures. The ridge is a regular angulation seen on the two flanks in each septal interval. It is probable to be impressed by the septal

adnation on the conch. Whether or not the surface of the shell is ridged is, however, as yet indetermined. The ventro-lateral lobe is very acute and some 15 degrees at the apex. On the broken surface it is seen that the septal suture is shouldered near the periphery of the ventral wall.

Comparison:—The subtriangular section of the whorl is commonly met with in *Hercoglossa*, but rare in *Aturia*. (Comp. figs. 116 and 125, STENZEL, 1940). The dorsal position of the siphuncle and the aspect of the septal suture however, prevent the reference of this species to *Hercoglossa* (MILLER and FURNISH, 1938). Though such a broad whorl is uncommon in *Aturia*, *A. triangula* STENZEL has the inner volution triangular and broader than the whorl of this species.

Aturia paeziczae OPPENHEIM from the Palaeocene (?) of Egypt (MILLER, 1947) is another having a broad triangular whorl, as high as broad. In that species, however, the median height of the last whorl is quite reduced and the suture not far removed from *Aturioidea*.

The whorl section of *Aturia luculoensis* MILLER from the Miocene of Angola is also very broad, but well rounded and elliptical rather than triangular. I am particularly interested in the specimen of the Angola species in fig. 6, pl. 31, MILLER, 1951, to see that the median ridge appears to be present between the sutures. The ridges are however, not so distinct as those of the present species. The lateral saddle may be more or less undulated in that species, but not so clearly biarcuate as in this species.

Combined with the triangular whorl section, the high specialization of the lateral saddle and the appearance of the interseptal ridge reveal that this species is so unusual in the Aturidae that it may be segregated out of *Auria* s. str., if better material is availabe.

Occurrence:—Oyake formation of Upper Eocene Nogata group MATSUSHITA, (1943), at Aso Yoshikuma coal mine, Usui-town, Kaho country, Fukuoka Prefecture.

References cited

KOBAYASHI, T. (1954a), A new Cymatoceratid from the Palaeogene of Northern Kyushu in Japan. *Japan. Jour. Geol. Geogr., Vol. 24.*

—— (1954b), A new Palaeogene Paracenoceratoid from Southern Kyushu in Japan. *Ibid. Vol. 24.*

MATSUSHITA, H. (1943), Geology of the Coalfields in Northern Kyushu. *Kyushu-Kozangaku-Kaishi, Sp. No.*

MILLER, A. K. (1947), Tertiary Nautiloids of the Americas. *Geol. Soc. Am. Mem. 23.*

—— (1951), Tertiary Nautiloids of West-Coastal Africa. *Ann. de Mus. du Congo Belge, Tervuren, Sér. in 8°, Sér. Géol. Vol. 8.*

—— and FURNISH, W. M. (1938), *Aturia* from the Tertiary of Mexico. *Jour. Pal., Vol. 12.*

NAGAO, T. (1926), *Aturia yokoyomai*, nom. nov. from the Palaeogene of Kyushu. *Sci. Rep. Tohoku Imp. Univ, 2d. Ser., Vol. 9, No. 2.*

SHIMIZU, S. (1926), On two Species of Nautiloidea from the Tertiery of Japan. *Ibid. Vol. 9, No. 2.*

STENZEL, H. B. (1940), Tertiary Nautiloids from the Gulf Coastal Plain. *Univ. Texas Publ. 2945.*

YOKOYAMA, M. (1911), Some Tertiary Fossils from the Miike Coal-field. *Jour. Coll. Sci. Imp. Univ. Tokyo, Vol. 27.*

PROCEEDINGS OF THE PALAEONTOLOGICAL SOCIETY OF JAPAN

「日本古生物学会第63回例会」1956年6月20日北海道大学理学部地質学鉱物学教室に於いて開催した（参会者28名）。講演者並びに講演題目は次の通りである。

夕張夾炭層より *Eucommia* の産出（代読）……藤岡一男

石狩統産 *Ginkgo* の種子と表皮細胞（代読）……藤岡一男・高安泰助

清水沢炭鉱夕張夾炭層産の *Acer*（代読）藤岡一男

吉岡層群の植物化石（代読）……藤岡一男

稚内市樺岡産化石珪藻について ……押手 敬

Analysis of Foraminiferal Assemblages from Arari Bay, Izu Peninsula, Japan（代読）……Hiroshi UJIIE

Mesoschubertella, A New genus of Permian fusulinids from Japan……Mosaburo KANUMA and Sumio SAKAGAMI

Fusulinids from the limestone conglomerate in the Nishinoiri and Sakaguguchiiri Valley, Kanyo, Hinode-mura, Nishitama-gun, Tokyo-to, Japan……Sumio SAKAGAMI

Upper Viséan corals newly found in the Northern Kitakami mountain region……T. YOSHIDA and M. KATO

New species of *Siphonodendron* from Japan……M. MINATO and M. KATO

Amygdalophyllum giganteum (YABE et HAYASAKA) newly found from Okayama Prefecture…… M. MINATO and K. NAKAZAWA

Revision of Halysitidae（代読）……Takashi HAMADA

Bryozoa from the Daishaka Formation (Pliocene) Nakatsugaru-gun, Aomori Prefecture, Japan（代読）……Jun KATAOKA

On the Triassic Rhynchonellids of Japan（代読）……Akira TOKUYAMA

Waagenochoncha from the Permian of the Kitakami mountains, N. E. Japan ……I. HAYASAKA and M. MINATO

Spinomargunifera from Japan ……M. MINATO and K. NAKAMURA

Tertiary Mollusca from the Asôgima-formation, Niigata Prefecture（代読）……Tsutomu UTASHIRO

Miocene Mollusca from the Betuchiyo-formation, Nagano Prefecture（代読）……Tsutomu UTASHIRO

Some Species of Genus *Thracia* from Hokkaido (Studies on the Molluscan fossils from Hokkaido—III)……S. UOZUMI

北海道産の所謂 "*Propeamusium*" と "*Delectopecten*" の産出層準について…魚住 悟・藤江 力

日本産 *Mya* 属の分布及びその変異について（その1）……藤江 力

宮崎層群産 *Venericardia* と *Crassatellites* について（代読）……首藤次男

On "*Patinopecten iitomiensis*"（代読）……Masahiko AKIYAMA

On Some Species of Genus *Glycymeris* from Central Shinano, Japan（代読）……Kunio TANAKA

On Some Species of Miocene *Dosinia* from Northeast Honsyu, Japan（代読）Shigeru AOKI

Fossil and Recent Species of the Genus *Panomya* from Japan（代読）Saburo KANNO

Inoceramus mihoensis n. sp., とくにその意義……松本達郎

A Study on the Liassic Bakevellias in Japan（代読）……Itaru HAYAMI

Further Notes on the Kossmaticeratids from Hokkaido ……Tatsuro MATSUMOTO

Turonian *Damesites* from Hokkaido ……Tatsuro MATSUMOTO

Revision Chronologique de la Série de Karakuwa (Jurassique moyen)（代読）……Tadashi SATO

A Palaeometeorological Interpretation to the Occurrence of the Argonautinae in Province Kaga, Central Japan（代読）……Teiichi KOBAYASHI

長野県中新世産巨大なカニの附属肢破片（?）化石（代読）……今泉力蔵

日本古生物学会例会通知

	開催地	開催日	講演申込〆切日
第64回例会	京都	10月6日	9月15日
第65回例会	福岡	12月1日	11月10日

1956年8月25日 印刷
1956年8月31日 發行

定價 1部250圓

東京大學理學部地質學教室內
日本古生物學會

編集者 小林貞一
發行者 市川健雄
(振替口座東京84780番)
印刷者 東京都港區芝浦1丁目1
株式會社 ヘラルド社 富田元

Regulations for Publication in Transactions and Proceedings of the Palaeontological Society of Japan (24 June 1950)

1. Manuscripts should be submitted to the Editor after being read at the General Meeting or the Ordinary Meeting of the Palaeontological Society of Japan or of the Geological Society of Japan.
2. Manuscripts shall be written in European language, they should be typed on one side of standard-size (22. 5×27. 5 cm) paper and double-spaced throughout. Biological names should be in italics and be underlined by the author.
3. Manuscripts (including of text-figures, maps and tables) will be limited to 6 printed pages (14-15 type written pages).
4. Illustrations will be limited to one plate (14. 2×20. 0 cm).
5. Text-figures (2 if less than 6 tsubo, 1 tsubo is 1 square sun) should be drawn carefully on white paper with drawing or Indian ink, letters used in the figures should be either printed or typed letters pasted-in. Figures may be reduced, so authors are requested to carefully select the size and thickness of the lines or letter used.
6. Maps should be accompanied with scale, fractions should not be used.
7. The author is requested to pay for any cost extending beyond the above stated regulations.
8. Manuscripts should have the title and a brief abstract in Japanese (such will be added for persons not familiar with Japanese language).
9. Literature cited or referred to should be listed at the end of the manuscript in the form of bibliography. Bibliography should be arranged in alphabetic order of author and by year. The order will be, Author, Year, Title of Paper, Name of Journal, Volume, Page, Plates, Figures, Maps, Tables.
10. The author's official address should be given below his name, under the title.
11. The desired number of reprints should be indicated on the right corner of the front page of the manuscript. 50 reprints without cover, but with reference to volume, number and year will be furnished free of charge to the author (if more than one author is involved they shall be divided). Additional reprints will be furnished at the printers rate.

Editorial Regulations

1. The Editorial staff will transact, preserve and edit the manuscripts.
2. When the Editorial Staff transacts a manuscript, a notification with date of acceptancew ill be sent to the author, if the manuscript is clear, and abides with the regulations.
3. Acceptance or non-acceptance of manuscripts will be decided by council of Chief Editor and Chairman.
4. Manuscripts not accepted for publication will be returned to the author with notification from the Chief Editor of the reason(s) for its rejection.
5. Manuscripts accepted, will be published in the order received with the date of acceptance indicated thereon.
6. Manuscripts whose contents are altered by the author after being accepted for publication, will have their date of acceptance changed.
7. The printing style will be as Journal of Paleontology.
8. Proof reading will be done under the responsibility of the Publication Committee.